Recognizing 30 Years of Accomplishments and Envisioning an Innovative Future - The 2024 Annual Conference of the Health Care Systems Research Network

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Abstract The Health Care Systems Research Network (HCSRN) kicked off the 2024 Annual Conference on April 9, 2024, in Milwaukee at the Hyatt Regency with nearly 275 participants from 19 HCSRN member institutions. This year, HCSRN attendees joined their colleagues to reconnect and network during the three-day conference featuring the theme, "Advancing High-Quality, Equitable Research in the Age of New Health Care Technologies." (*J Patient Cent Res Rev.* 2024;11:XX-XX.)

The Health Care Systems Research Network (HCSRN) Annual Conference has a long-held reputation of serving as a venue to facilitate new collaborations, disseminate scientific findings, and share the challenges and triumphs of conducting research in a real-world care delivery setting. Bringing together a diverse group of members and non-members, study managers and researchers, health systems leaders, funding agency representatives, clinicians, and patient partners, this meeting is eagerly anticipated every year. Attendees appreciate the ample opportunities to network and exchange the latest scientific findings. The conference objectives for this year were to highlight scientific findings from HCSRN research projects and to spur collaboration on research initiatives that improve health and health care for individuals and populations.

Deeply committed to supporting public-domain collaborative research that benefits patients, communities, and the broader population, HCSRN is an integral part of the US and international research landscape. Through its established partnerships with other major research organizations, federal funders, and universities—and through leadership in important national initiatives—HCSRN is a leader in population health research.[1]

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Denise B. Angst, PhD, RN, Vice President, Academic Research & Strategic Partnerships at Advocate Aurora Research Institute, served as the informal host for the conference. She opened the meeting by reading a Land Acknowledgment recognizing that Milwaukee, Wisconsin, was on land that originally was, and continues to be, homeland to a number of Native American tribes. David M. Kent, MD, MS, provided the opening plenary address. Dr. Kent is the Founder and Director of the Tufts Predictive Analytics and Comparative Effectiveness (PACE) Center, at the Institute for Clinical Research and Health Policy Studies (ICRHPS), at Tufts University. During his presentation entitled, "An Overview of Bias and Fairness in Algorithmic Models," he discussed the distinction between bias and fairness and reviewed different "fairness criteria," citing the impossibility of simultaneously satisfying these. Audience members were introduced to the concept of "label bias" and the use of race in clinical prediction models. Importantly, Dr. Kent discussed the harms that may arise when race is omitted in some situations where the variable carries substantial prognostic information and the necessity of evaluating trade-offs in considering its use in clinical prediction. These insights prompted many discussions among attendees and will help inform the development of HCSRN's and its member institutions' Virtual Data Warehouse (VDW).

State of the Network

Governing Board Chair, Michael Horberg, MD, MAS, of Kaiser Permanente Mid-Atlantic States, provided the State of the Network address on Wednesday, April 10. Dr. Horberg noted the significance of coming together to facilitate stimulating collaborative research while

disseminating research findings and promoting scientific rigor in health sciences and health services research. He pointed out that HCSRN is uniquely positioned to contribute to the national and international research agendas through a shared commitment to public domain research and by advancing the notion of learning health systems, where research evidence informs practice and clinical practice informs research.

As HCSRN recognizes its 30th anniversary, a commemorative logo was designed for the occasion and utilized on specialty merchandise. In honor and special tribute to the insightful early leaders of the network, to whom HCSRN and its accomplishments are deeply indebted, a new annual award was announced, to be bestowed for the first time at the 2025 annual conference. Each year, the Founders Award will recognize an individual who has best exemplified the spirit of the early founders in their service and lasting contribution to the network, including the vision and confidence to create something new or unique in embedded health care research; the spirit of fostering collegiality and collaboration across partner organizations, which remains among the most important values of the network; and the persuasive expertise and determination to create a legacy of funded platforms or other valuable resources for conducting productive research in HCSRN. Videos of members sharing their HCSRN stories were collected, and the Welcome Reception featured a recap of HCSRN history.

Dr. Horberg noted the many accomplishments of the past year. HCSRN received its 501(c)3 designation from the IRS, affirming our non-profit status. There has been a focus on improving operational efficiencies through policy development, database implementation, enhanced communication, and engaged and committed leadership. The transition to SharePoint® and Teams®, which further fosters collaboration within the VDW was an important accomplishment during the year.

HCSRN created the Value Task Force with the explicit purpose of identifying and prioritizing ways to enhance the value of HCSRN membership for all constituencies. The task force spent part of the year gathering data through surveys, conversations with HCSRN investigators and staff, and a review of HCSRN Board reports and documents. In December, the task force issued their report to the Governing Board.

Dr. Horberg reviewed the task force recommendations noting that the emphasis in 2024 will be on the high-priority recommendations, including developing and implementing a mechanism for tracking collaboration across HCSRN institutions, creating a plan to increase HCSRN visibility internally within our member institutions and externally, and developing a long-term plan for HCSRN membership growth. The remaining recommendations will be reviewed and prioritized in 2025.

Dr. Horberg thanked the Value Task Force for their work. The group included Eric Wright, Geisinger Research; Teaniese L. Davis, Kaiser Permanente Georgia; Denise Angst, Advocate Aurora Research Institute; Leslie Hinyard, Advanced HEAlth Data (AHEAD) Institute, St. Louis University; J.B. Jones, Sutter Health; Kathleen Mazor, University of Massachusetts Chan Medical School (retired); and support from the Central Office including Suzanne Simons, Mike Breslin, and Alex Grandin.

Dr. Horberg shared an overview of VDW[2] usage including the core tables. HCSRN's VDW utilizes the common data model, mapping clinical and claims data to a common format, which is designed to support multisite health system research. This approach creates efficiencies for data extraction, collection, and management. Appreciation was extended to Stacey Honda, MD, PhD, VOC Board Liaison; Mark Jurkovich, DDS, VDW Scientific Lead; Yonah Karp, VDW Technical Lead; Celeste Machen, VDW Coordinator; Jenny Staab, PhD, Quality Assurance; Rick Krajenta, Lab Consultant; and the workgroup leads for their dedicated work on behalf of the organization.

Dr. Horberg recognized Annual Conference Planning Committee Co-Chairs, Karen Coleman, PhD, and Denise B. Angst, PhD, RN, as well as the committee for their commitment and efforts in planning the event. Appreciation was also extended to volunteers for their role in the conference's success. The 2025 conference will be held in Saint Louis, MO, April 8-10, 2025.

HCSRN welcomed sponsors who supported the meeting through financial contributions. Advocate Aurora Research Institute joined at the Platinum level. Genentech and the Patient-Centered Outcomes Research Institute (PCORI) participated at the Gold level, and AstraZeneca was a Bronze-level sponsor.

Award Recipients

HCSRN members celebrated their colleagues' achievements with the award winners being announced. Dr. Lisa R. Miller, Matero of Henry Ford Health Systems, was recognized for Paper of the Year entitled, "Suicide Attempts After Bariatric Surgery: Comparison to a Nonsurgical Cohort of Individuals With Severe Obesity," published in *Surgery for Obesity and Related Diseases* last year.[3]

Jordan Braciszewski, PhD, of Henry Ford Health Systems, was recognized as the Mentor of the Year. His colleagues from Henry Ford Health Systems, Kaiser Permanente, and other health partners nominated him for this prestigious award, which acknowledges an individual who has provided guidance and motivation, as well as shares knowledge, expertise, and wisdom.

Jennifer M. Boggs, PhD, MSW, of Kaiser Permanente Colorado, received the Investigator of the Year Award for her abstract entitled, "Results from a Hybrid Effectiveness-Implementation Trial to Improve Uptake of a Secure Firearm Storage Program in Pediatric Primary Care." Her abstract was reviewed on overall quality and specific criteria including research abstract quality, relevance and originality, quality of science, impact, generalizability, and scalability.

Two poster awards were presented. The Poster Session 1 winner was Jana Hirschtick, PhD, MPH, of Advocate Aurora Research Institute, for her abstract entitled, "Estimating Underdiagnosis Using the Electronic Health Record: A Long COVID Case Study." The winner of Poster Session 2 was Amandeep Mann-Grewal, MPH, of Sutter Health Research Center for Health Systems Research, for her poster entitled, "Self-Reported Survey Results about Experience of Virtual Reality Headset on Reducing Anxiety in Pediatric Urgent Care Clinic."

Workshops and Special Sessions

New this year was a pre-conference grant writing workshop bringing together experts throughout HCSRN to assist early investigators with NIH R-series applications. The goals of the workshop were to provide practical knowledge and feedback for writing NIH awards with a special emphasis on R grant mechanisms and to create a community of new investigators working towards NIH funding from which they can draw support. Topics included writing outstanding specific aims, understanding the sections of grants that are especially important for reviewers, creating a conceptual model, telling a "story," formatting a grant for maximal visual impact, and choosing a funding announcement and institute. Workshop presenters included Karen J. Coleman, PhD, of Kaiser Permanente Southern California; Stephanie Hooker, PhD, MPH, of the HealthPartners Institute; and Kyle Christensen, PhD, of the HealthPartners Institute.

On Wednesday, April 10, HCSRN offered a special interest panel on "Public Health Research and Navigating the Media." The panel explored how researchers interact with media and shared best practices. The panel featured researchers who have successfully navigated the science and media divide including Benjamin W. Weston, MD, MPH, FAEMS, of The HUB for Collaborative Medicine; Nick Buttrick, PhD, of the University of Wisconsin-Madison; and Devi Shastri, a public health reporter for The Associated Press.

The final plenary session entitled, "Funding Priorities and Funding Strategies: Insights and Information from National Funders," convened a panel of established experts who provided an overview of each agency's funding priorities, tips for navigating the grant application process, what to expect when one's application is undergoing review, and the award process. The panel included Brent Sandmeyer, MPH, of the Agency for Healthcare Research and Quality; Steve Clauser, PhD, MPA, of PCORI; and Jamae Morris, PhD, MA, of the Robert Wood Johnson Foundation.

A special presentation by PCORI entitled, "Building Meaningful and Sustainable Engagement in Research: PCORI's Foundational Expectations for Partnerships," followed the Funder's Panel. PCORI assembled a panel including Kimberly Haugstad, MBA, CEO of UpEquity Corporation; a member of the PCORI Advisory Panel on Rare Disease, Karen E. Kippen, MSA, MT (ASCP), of Henry Ford Health Systems; Karen Margolis, MD, MPH, of HealthPartners Institute; Ellen Schultz, MS, of Ellen Schultz Consulting; and moderator Kristin L. Carman, MA, PhD, and Mabel Crescioni, DrPH, JD, both of PCORI. The session highlighted PCORI's new "Foundational Expectations for Partnerships,"[4] which updates the 2014 PCORI Engagement Rubric and provides expanded guidance for meaningful engagement to advance patient-centered outcomes research and health equity. Included was the exploration of the six new Foundational Expectations and the implications for principal investigators, study teams, and patient partners, as well as community perspectives on the impact and lessons learned from building meaningful engagement in research.

The VDW Implementation Group (VIG) Meeting was the final session of the conference. The half-day meeting brought together nearly 45 site data managers, coders, researchers, programmers, and other staff members. The agenda featured sessions on work groups including Enrollment and Demographics, Utilization, Patient Reported Outcomes (PRO), and Vital Signs and Social History. There was an open discussion surrounding SAS® (SAS Institute Inc). Specifically, discussion surrounded whether sites will be moving away from this analytics software and whether the rising cost is a consideration. Another topic focused on whether there have been organizational incentives for VDW programmers to learn new languages. The session also addressed how people are utilizing the new SharePoint/Teams environment,

which replaced Alfresco® last year. The VIG meeting is always a productive time bringing together members from different institutions to reconnect and engage in spirited dialogue, while advancing the work of one of HCSRN's greatest assets.

Concurrent, Poster, and Panel Presentations

Looking at the conference by the numbers, there were 15 accepted abstracts and panel presentations, which resulted in 21 concurrent sessions and 7 panel presentations. During the two sessions, there were 51 peer-reviewed posters presented. Two ancillary meetings of scientific interest groups and research project teams were held to discuss their work. This was made possible due to the dedicated efforts of 14 Annual Conference Planning Committee members and 31 on-site volunteers who planned and ran the conference.

Social Determinants of Health, Mental Health, and Addiction; Stakeholder Engagement; Health Equity; Implementation/Health Delivery Science; Technology and Decision Support; and the Virtual Data Warehouse were some of the broad categories of the abstract submissions. Panel sessions covered a wide range of topics including:

- A Learning Health System Approach to Improving Racial and Ethnic Diversity in Clinical Trials Participation
- Advanced Analytics to Support Learning Health Systems: A Roadmap
- System-Based Strategies to Optimize Guideline-Directed Medical Therapy in Patients Living with Heart Failure
- Collaborative Cancer Research in HCSRN: The Past, Present, and Future
- Elevating the Patient's Voice in Cancer Care
- Advances in Food and Nutrition Security in Healthcare: Progress from Kaiser Permanente's Research and Human Centered Design
- The All of Us Research Program: Utilizing the Researcher Workbench

All the accepted scientific abstracts presented at the 2024 HCSRN Annual Conference can be found in this issue of the *Journal of Patient-Centered Research and Reviews*.[5]

HCSRN History

As HCSRN looks forward to an innovative future, it is important to recognize its history and how it arrived at this pivotal time. In 1994, leaders of eight research groups housed within Health Maintenance Organizations (HMOs) established an informal consortium to foster collaborative health and health care research. Early objectives of the new partnership, which they concisely named the HMO Research Network, included providing a professional community for non-academic health researchers, exploring issues in the conduct of health research within the context of clinical practice, and raising their institutional and collective visibility to research sponsors.[6] Fast forward to today, 30 years on from the founding, HCSRN retains those original objectives within its Mission, Vision, and Values.[7] Indeed, it has enhanced itself along the way with membership growth and broadened organizational structures among participating health systems, demonstrating an impactful, ongoing history of funded research networks and multisite projects and establishing a well-regarded common data model.

Soon after its formation, the network held the first of what would become an annual conference in Portland, Oregon, in April 1995. The "First Annual Conference of HMO Research Centers" had over 100 registered attendees from founding member institutions, future member sites, and academic and sponsor partners. Plenary presentations at the inaugural meeting covered several timeless subjects in HCSRN, including research funding opportunities, navigating public domain research with industry partners, effective dissemination of study findings, and strategic directions for the network. Parallel research tracks for the conference covered a wide range of health and health care topics, including Mental Health, Substance Abuse, Cancer, Cardiovascular Disease, Genetics, Asthma, HIV, Diabetes, Immunizations, Prevention and Screening, Women's Health, Behavioral Health, Long-Term Care, Practice Guidelines, and Shared Decision Making. Interestingly, the first conference 30 years ago was held in conjunction with the 30th anniversary of the local host organization, the Center for Health Research at Kaiser Permanente Northwest, and their own celebratory research symposium.[6] Since then, with exception to the pandemic cancellation in 2020 and the virtual meeting in 2021, an in-person conference has been held in the spring of each year, organized by a multisite committee, with planning direction from a local/lead host organization and, more recently, from HCSRN's central office.[8] Other city venues for the annual network conference have included Minneapolis, MN; Boston and Cambridge, MA; Oakland, San Francisco, Long Beach, Pasadena, and San Diego, CA; Honolulu, HI; Atlanta, GA; Seattle, WA; Denver, CO; Detroit, MI; Santa Fe, NM; Danville, PA; Austin, TX; Phoenix, AZ; and Milwaukee, WI.

Early leaders of the network were inspired by the collaborative success demonstrated by the Centers for Disease Control and Prevention's Vaccine Safety Datalink (VSD), which conducted efficient multisite

studies in large, defined health plan member populations.[9] The VSD had formed in 1990, predating HCSRN, but with an organizational membership that included many HCSRN sites. Starting in the late 1990s, forward-looking HCSRN scientific leaders were able to make a compelling case to federal sponsors and peer-review panels regarding the promise of embedded health system research on a wider range of topics. These included the ability to assemble large patient populations with defined observation windows; direct links to, and familiar use of, a growing base of electronic medical record data; and the availability of researchers with close ties to clinical and system leaders to obtain guidance on relevant health care and health coverage questions, as well as on the feasibility of translational implementation plans. A succession of funded research (or public health surveillance) networks within HCSRN followed. A broad set of examples of these include the National Cancer Institute's Cancer Research Network (CRN) in 1999;[10] the National Institutes of Health Roadmap's Coordinated Clinical Studies Network in 2004;[11] the National Heart, Lung and Blood Institute's Cardiovascular Research Network in 2007;[12] the Food and Drug Administration's Mini-Sentinel (later Sentinel) medical product safety surveillance initiative in 2009;[13] the National Institute of Mental Health's Mental Health Research Network in 2010;[14] the National Institute on Aging's HCSRN-OAICs Aging Initiative (in collaboration with the Claude D. Pepper Older Americans Independence Centers) in 2014;[15] and the National Institute on Drug Abuse's Health System Node in 2016.[16]

The influence of funded research consortia within the history of HCSRN has been substantial and manifold. In addition to sponsoring specific impactful collaborative research projects, funded participation has resulted in the development of a critical multisite research infrastructure for HCSRN, including key contact directories, routine communications, approved contractual subaward and data use agreement templates, early mechanisms for Institutional Review Board deferral, a range of topical scientific interest groups, methodologic- or results-oriented webinars, pilot project funding, and investigator training. The CRN, for example, whose four cycles of funding from 1999 to 2019 included just 9 core projects, also conducted more than 400 supplemental, developmental, or separately funded ancillary projects leveraging CRN capacity and infrastructure.[10] Several legacy CRN research projects are still underway today. A particularly successful initiative of the CRN was the CRN Scholars career development program, in which several dozen junior researchers from network sites and academic partner institutions received two years of mentored training to conduct successful embedded health system cancer research.[17] Perhaps the most influential legacy of research network activity is the VDW mentioned above.[18] First created by CRN leaders in 2002 to facilitate multisite research and preserve locally curated data in standardized form, the VDW allows participating sites to assemble provider-, patient-, and encounter-level data from claims and Electronic Health Records, in addition to mapped tumor registry data, within a common set of data standards. Each health system maintains VDW data in secure fashion behind its local firewall and directly controls its use. In addition to common data standards, the VDW incorporates code libraries, macros and applications, cohort definition tools, data quality assessment checks, and more. For over 20 years, the VDW has provided HCSRN research teams with an efficient approach to rapidly assemble standardized data for collaborative studies, and over time, it has served as a template for several other popular data models.

Currently HCSRN has grown to have 20 member organizations, including research departments within 19 US-based health systems and one based in Israel. Current member sites not among the eight founding institutions joined between 1995 and 2022. Over time, an additional handful of organizations joined and then later departed the network, either due to dissolution of their research institute or other realignment of their health system priorities. In 2015, an important symbolic adjustment was made, with a name change from HMO Research Network to Health Care Systems Research Network, purposefully reflecting the varied organizational structures among participating systems. With an eye for the future, with its new formalized non-profit status and association management team providing support, the network has strategically recommitted to efforts that will foster multisite collaboration of embedded health system researchers, raise network visibility, increase value at the individual and institutional level, and assure continued, efficient access to quality standardized health care data for research.

The 2024 HCSRN conference in Milwaukee celebrated the 30th anniversary of the network, and additional celebrative activities will continue throughout the year.

In summary, attendees of this year's conference were exposed to leading-edge science, inspiring speakers, programming innovations, and time for networking and fostering an inclusive collaboration environment. Looking ahead, the 2025 Annual Conference will be held in Saint Louis, MO, April 8-10. We hope to see you there!

Acknowledgments

Special thanks to the HCSRN Annual Conference Planning Committee: Karen Coleman (Co-Chair) and Corinna Koebnick of

Kaiser Permanente Southern California; Denise Angst (Co-Chair), Eva Chang, and Veronica Fitzpatrick of Advocate Aurora Research Institute; Inih Essen and Stephanie Hooker of HealthPartners Institute; Leslie Hinyard of Advanced HEAlth Data (AHEAD) Institute; Anthony Olson of Essentia Health; Dea Papajorgji-Taylor of Kaiser Permanente Center for Health Research; Apoorva Pradhan of Geisinger; Claudia Steiner of Kaiser Permanente Colorado; Ivana Vaughn of Henry Ford Health System; and Kanetha Wilson of Kaiser Permanente Georgia.

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Abstracts From the 2024 Health Care Systems Research Network (HCSRN) Annual Conference, Milwaukee, Wisconsin

The Health Care Systems Research Network (HCSRN) comprises 20 learning health systems with integrated care delivery and embedded research units. The network's annual conference serves as a forum for research teams from member institutions to disseminate project findings, explore scientific collaborations, and share insights about population-based research practices that can measurably improve health and health care for all. The theme of this year's conference was "Advancing high-quality, equitable research in the age of new health care technologies." Abstracts presented at HCSRN 2024 are published in this issue supplement of the Journal of Patient-Centered Research and Reviews, the journal of record for HCSRN's annual conference proceedings. (*J Patient Cent Res Rev.* 2024;11:XXX-XXX.)

LATE -BREAKING ABSTRACTS

BEHAVIORAL HEALTH

How Can Measuring Whole Health Support Mindfulness Classes? Mixed-Methods Secondary Data Analysis of a Randomized Controlled Trial of Mindfulness With Veterans With Posttraumatic Stress Disorder

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Background: Mindfulness is a commonly recommended treatment for many mental and medical health concerns. Our objective was to identify how a wellness self-assessment, the Personal Health Inventory (PHI), administered before and after mindfulness classes could support delivery of classes, relate to other health services outcomes, and support posttreatment planning.
Methods: This mixed-methods secondary analysis of data from a randomized controlled trial of primary care-based mindfulness classes for veterans with posttraumatic stress disorder. Analyses focused on interpreting 28 veterans' responses on the PHI and understanding how PHI responses related to other health care factors, including patient outcomes and class attendance. Aim 1 analyses focused on interpreting preclass PHI responses using a qualitative matrix analysis of open-ended responses, quantitative difference scores, and a mixed-methods joint display to generate a summative estimate of motivation. Aim 2 analyses quantitatively used the estimate of motivation to predict mindfulness outcomes and class attendance. Aim 3 focused on identifying postclass treatment goals.
Results: Most (24 of 28) veterans' pretreatment PHIs had open-ended responses indicating mindfulness-related goals such as learning/using mindfulness strategies, feeling better, or growth. A mixed-methods analysis of open-ended and numeric responses suggested that 61% of veterans were highly motivated for mindfulness. Veterans rated as highly motivated were significantly more mindful following classes (FFMQ-15 mean [standard deviation (SD)]: 46.56 [6.05]) compared to veterans who were rated as highly motivated (mean [SD]: 41.50 [6.65]); t(24)=2.00; P=0.029; d=0.80. Veterans rated as highly motivated did not attend significantly more classes (mean [SD]: 3.17 [1.24]) compared to veterans who were not rated as highly motivated (mean [SD]: 2.82 [1.25]); t(26)=0.75; P=0.231; d=0.29. Veterans' open-ended responses on the posttreatment PHIs supported posttreatment goal setting and care coordination.
Conclusion: We offer practical recommendations for how mindfulness facilitators can use PHIs to support mindfulness class delivery and posttreatment planning. We developed a step-by-step strategy for how to review PHI open-ended responses and numeric rating items in a way that predicts patient outcomes. We believe that this procedure can be adapted for other services for replication in other settings.

Medical and Psychiatric Comorbidities and Health Care Use in Adult Survivors of Childhood Sexual Abuse Seen in a Chronic Pelvic Pain Clinic

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Background: Childhood sexual abuse (CSA) is a significant public health problem with numerous short- and long-term physical and behavioral health consequences, including chronic pelvic pain. Herein, we compare demographic, clinical, and health care utilization data for patients disclosing a history of CSA vs

other abuse vs no abuse and who were seen in a pelvic pain clinic.
Methods: Data were obtained from adult patients (N=345) seen in the pelvic pain clinic of Kaiser Permanente Colorado's obstetrics/gynecology department between 2019 and 2023 who completed a routinely administered International Pelvic Pain Society (IPPS) questionnaire for clinical care. The questionnaire contained information on demographics, pain history, history of abuse, medical and psychiatric comorbidities, and prior number of health care providers seen for their pelvic pain. De-identified questionnaire data were entered into a REDCap database and analyzed with SAS 9.4. Analyses compared patients reporting a history of CSA (which could also include physical and/or emotional abuse) to those reporting other abuse but not CSA and to those reporting no history of abuse.
Results: Among patients completing the questionnaire, 55 (15.9%) reported CSA, 72 (20.9%) other abuse, and 218 (63.2%) none. No significant group differences were found for age, race, education, employment, pain severity, or physical health. Compared to patients reporting no history of abuse, any type of abuse history was associated with significantly lower mental function (P<0.011), more medical (P=0.016) and psychiatric (P=0.001) comorbidities, and more health care providers seen (P=0.013). Patients reporting CSA had the highest number of medical and psychiatric comorbidities and highest number of health care providers seen of the three groups. Compared to patients reporting a history of other abuse, those reporting CSA had higher rates of fibromyalgia (8.3% vs 16.4%), trauma (43.1% vs 65.5%), and posttraumatic stress disorder (36.1% vs 54.5%).
Conclusion: More than one-third of patients in a pelvic pain clinic disclosed past physical, emotional, or sexual abuse, reporting poorer mental function, more medical and psychiatric comorbidities, and more health care providers seen than those without such history. Those disclosing CSA had the most medical and psychiatric comorbidities (notably trauma and posttraumatic stress disorder) and saw the most health care providers.

CANCER

Challenges to Providing Genetic Cancer Risk Information to Relatives of Deceased Patients Who Had Ovarian Cancer: Lessons From the GRACE Study

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Background: The Genetic Risk Assessment in ovarian CancEr (GRACE) study aimed to identify people with a prior diagnosis of ovarian cancer and offer genetic risk information to them and their family members. One goal of GRACE was to assess the feasibility of providing genetic information to relatives of deceased individuals by leveraging archived pathology specimens for germline genetic testing.
Methods: Using a novel "traceback testing" approach, we searched tumor registries at Kaiser Permanente (KP) Northwest and KP Colorado and identified 1874 ovarian cancer cases diagnosed from 1998 to 2020. Medical record data were used to find those that either did not have genetic testing or had testing limited to *BRCA1/2*. For deceased individuals, chart review identified relatives to contact and ask permission to test archived tissue. Genetic test results were shared with the family. Subsequent genetic testing of the familial variant was offered to first- and second-degree relatives if a pathogenic or likely pathogenic (P/PL) variant was detected.
Results: Of 945 deceased individuals, 75% had no record of genetic testing and 10% had testing of *BRCA1/2* only. Challenges arose in the recruitment of families of deceased cases. First, legal and regulatory guidance limited whom the study team could contact and what information could be communicated about the patient's cancer history. Second, finding tissue specimens suitable for testing was problematic. Thus, we attempted direct outreach to family members of deceased individuals and offered genetic testing to first-degree relatives using mailed saliva collection kits. To date, 92 relatives from a total of 202 deceased probands have consented, with at least 1 member from 73 of the families consenting to testing, a 36% recruitment success rate for families. We have tested 79 people and 9 were positive for a P/PL variant.
Conclusion: We observed low rates of genetic testing among deceased individuals, representing a significant care gap for surviving relatives. Legal and regulatory barriers limited our ability to provide this potentially life-saving information to families. We found that direct outreach was a feasible approach to provide genetic information to these families.

CANCER EPIDEMIOLOGY

Discovery of a Female Bias and Autoimmunity in Patients With Gastric Adenocarcinoma

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Background: Gastric cancer is the fourth-leading cause of cancer-related mortality worldwide, primarily affecting men over 60 years of age. In the United States, there is an unexplained trend of increasing incidence in women under 50 years old. Concurrently, autoimmune disease is on the rise in this demographic. We hypothesized that increased autoimmunity,

including autoimmune gastritis (AIG), is contributing to the rise in gastric cancer.
Methods: To test this, we determined the prevalence of autoimmune diseases in patients diagnosed with gastric cancer compared to those diagnosed with lung cancer. In this case-control study, gastric cancer was identified as the case group compared against a lung cancer control group. Gastric cancer, lung cancer, and a comprehensive list of autoimmune diseases were defined using ICD-9 and ICD-10 codes from the World Health Organization compendium. These codes were used to extract patient data, housed in HCSRN's Virtual Data Warehouse, from encounters at SSM Health facilities between 2016 and 2022. Chi-squared tests were performed to compare autoimmune prevalence between case and control groups.
Results: In all, 9982 patients with gastric cancer and 10,053 patients with lung cancer were identified. The gastric cancer cohort was 61.5% female compared to 52.4% female in lung cancer. Additionally, a higher prevalence in overall autoimmune disease (odds ratio: 1.5; P<0.0001), AIG-related autoimmune diseases (P<0.0001), and gastrointestinal autoimmune diseases (P<0.0001) was found in gastric cancer. Common autoimmune diseases like rheumatoid arthritis did not show any association with gastric cancer.
Conclusion: The significant increase in female prevalence among patients with gastric cancer may be capturing a demographic shift resulting from increased gastric cancer in young women. There was a strong pattern of association between gastric cancer and AIG-related autoimmune disease. These findings support AIG as a driving risk factor for gastric cancer.

DATA ANALYTIC METHODS

What Do We Know About Our Patients' Cannabis Use From the Electronic Health Record? A Mixed-Methods Approach

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Background: Cannabis use, which continues to increase, has known clinical effects; it is imperative clinicians know patients' cannabis use while providing medical care. Medical marijuana certifications in Pennsylvania are not yet integrated with other health-related data. To conduct electronic health record (EHR) research on cannabis, we must understand the current state of cannabis use data capture in the EHR.
Methods: In this mixed-methods evaluation of clinician and stakeholder experience of seeking and documenting cannabis use information in the EHR, we conducted semi-structured interviews with clinicians and stakeholders. We developed and administered a 32-question digital survey addressing the same topic, using the results of the qualitative interviews to inform the survey design.
Results: A total of 50 participants were interviewed, and 996 complete survey responses were received and analyzed. A majority of both interview and survey participants think it is important to document and be aware of cannabis use. They report variability in availability and access to information about cannabis in the EHR. It is inconsistently and poorly documented and documented in multiple places. Participants value the following information: use frequency, delivery route, type (medical vs recreational), indication, side effects, source, and dose. Inconsistency in documentation affects their ability to find and use the information when it is important to do so. Participants vary in where they document cannabis use. They report not knowing where or how to document cannabis use and experience a poor user experience when doing so.
Conclusion: Patient cannabis use data are incomplete and difficult to find in the EHR. Opportunities exist to improve the documentation of marijuana use. These opportunities include providing consistent guidelines on when, where, and how to document cannabis use in the EHR; standardizing data capture of relevant information; and improving the user experience for documentation of cannabis use in the EHR.

A Novel REDCap Instrument for the Extraction and Analysis of Marijuana Use From Electronic Health Record Data

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Background: Medical marijuana (MMJ) is available in Pennsylvania, and use likely impacts Geisinger patients in both positive and negative ways. Yet, patient-level MMJ certifications are not available to clinicians like for other scheduled drugs, increasing the need for tools that aid in consistent documentation practices.
Methods: We developed a systematic chart review protocol for extracting MMJ-related information using REDCap. With clinical stakeholder input, we determined relevant information and extraction guidelines. The protocol was developed and tested within a cohort of patients with MMJ certification documented using a customized smart data element (SDE) made available to clinicians following MMJ legalization in Pennsylvania. Characteristics were first identified on a pilot sample of patients (N=5) and then iteratively reviewed for optimization. Following the pilot, 2 research assistants independently extracted characteristics from 200 randomly selected patient charts, with a third reviewer completing duplicate reviews to determine reliability.
Results: This chart review protocol was feasible for those with minimal medical background to complete, and individual characteristics were extracted with high interrater reliability (kappa: 0.918, 95% CI: 0.903–0.934; P<0.001). MMJ

certification was largely documented by nurses and medical assistants (87%) and typically within primary care settings (68.6%). The SDE has 6 preset field prompts, including certifying provider, authorized dispensary, certifying conditions, dosage, product, and active ingredient. We found that preset fields were overall well-recorded (77% across all fields). Individual fields were more heterogeneous in terms of completion, with dispensary specified in 87% of documentation, certifying provider specified in 62% of documentation, and product dose specified in only 31% of documentation.
Conclusion: This model of chart review yields high quality data extraction that can serve as a model for other health record inquiries. Our evaluation showed relatively high completeness of SDE fields, primarily by rooming clinical staff. Improving adoption and fidelity of SDE data collection may present a valuable data source for future research on patient MMJ use and treatment efficacy and outcomes.

IMPLEMENTATION & HEALTH CARE DELIVERY SCIENCE

Creating a Career Path for the Learning Health System Workforce

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Background: The learning health system (LHS) model promises to advance the systematic integration of research evidence into health care practice. Yet, LHS researchers, who are skilled at applying rigorous research methods to generate evidence and rapidly implementing findings into care, don't always fit into traditional research career paths. We describe a novel job role to support LHS workforce development.
Methods: In May 2022, Kaiser Permanente Washington Health Research Institute combined 2 research and implementation roles to create the Collaborative Science Division. Collaborative scientists include master's- or doctoral-trained researchers who provide methodological or subject area expertise to applied research and quality improvement projects. The role differs from investigators in that they are not required to lead their own research programs. The role can be a long-term, 4-level career track for people interested in meaningfully contributing to research and health care improvement without developing their own research program or a short-term position for people to gain applied research experience before transitioning to an investigator role.
Results: The Collaborative Science Division currently includes 19 members (9 master's-level, 10 doctoral-level) with diverse skills and experience, including expertise in implementation science, clinical psychology, pharmacoepidemiology, health system science, quality improvement, evaluation, and qualitative and quantitative methods. In 2023, collaborative scientists served on 106 LHS and traditional research projects as project leaders, mentors, practice facilitators, analysts, evaluators, and stakeholder engagement experts. Responsibilities include conducting qualitative and quantitative data analyses, designing and implementing interventions, evaluating health system initiatives, developing clinical workflows, and disseminating results to clinical and community partners.
Conclusion: The collaborative scientist role is key to supporting LHS research by matching scientific and methods expertise to clinical and stakeholder needs. Research and health care organizations should consider implementing this career path to build a multidisciplinary workforce with diverse skills and broad expertise in health care implementation and traditional research methods.

ORAL PRESENTATIONS

AGING

Association of Older Adult Demographic Factors With Physical Therapy Attendance and 30-Day Emergency Department Revisit

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Background: Adults over the age of 65 account for 23.1 million visits to the emergency department (ED) annually, with a significant portion discharged home experiencing functional decline and adverse outcomes. While studies have examined physical therapist contributions to transitions for hospitalized older adults, the impact of physical therapy (PT) in the outpatient setting after discharge from the ED is limited.
Methods: A retrospective cohort study focused on adults ≥65 years old who visited 15 geriatric EDs within a single integrated health system in the Midwest was conducted. The study sample consisted of 1390 patients discharged home from the ED with an outpatient PT referral between January 2021 and December 2022. Predictor variables included age, median neighborhood income level by zip code, and ED primary diagnosis. Outcome variables were outpatient PT and 30-day ED revisit. Multivariate logistic regression analyses were performed to analyze the data, and propensity matching was used to match therapy and no therapy attendance groups when analyzing 30-day ED revisit.
Results: Patients with a median household income of $28,008–$55,000 had 51% lower odds of attending outpatient PT than those with median household income of $89,745–$149,131 (odds ratio [OR]: 0.49, 95% CI: 0.33–0.72). Patients with a diagnosis of vertigo/dizziness had 110% higher odds of attending outpatient PT (OR: 2.1, 95% CI: 1.11–3.92) and those with diagnosis of falls/impaired mobility 42% lower odds of attending (OR: 0.52, 95% CI: 0.37–0.92) compared to those with diagnosis of back pain. Older adults who didn't attend post-ED PT visit within 30 days had 88% higher odds of returning to ED compared to those who did attend (OR: 1.88, 95% CI: 1.34–2.64). Older adults with median household income of $0–

$55,000 had 66% higher odds of ED revisit compared to those in the $89,745–149,131 range (OR: 1.66, 95% CI: 1.01–2.74).
Conclusion: Older adults who attended outpatient PT demonstrated lower odds of ED return within 30 days of discharge, emphasizing potential benefits of timely outpatient PT interventions. These preliminary data highlight the potential of outpatient PT in reducing ED recidivism. The findings further suggest that socioeconomic factors may serve as a barrier to accessing outpatient PT, particularly among vulnerable populations.

Revisiting the Gold Standard: Exploring Measurement of Internalizing Psychopathology Among People With Parkinson's Disease via the Hamilton Scales

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Background: The Hamilton Anxiety and Depression Rating Scales are widely regarded as gold standards in assessing internalizing psychopathology despite critiques that include minimal discrimination between anxiety and depression. While proposed reconstructed scales aim to address these issues, validation (including factor structure and item functioning) in Parkinson's disease remains unexplored.
Methods: This study employed data from the Parkinson's Disease Biomarker Program. Individuals with less than 24 months of follow-up, complete data for Hamilton scale measurements at baseline visit, and diagnosis of Parkinson's disease (cases) or documentation of no neurologic diagnosis (controls) were included. All analyses were conducted separately for cases and controls. Demographic information was compared at baseline. Total scores were calculated for the original and reconstructed scores (proposed by Riskind in 1987) and correlated using Pearson's r. Exploratory factor analysis (EFA) using a weighted least squares mean and variance estimator was conducted (1–4 factors). Models were examined for construct validity and fit indices (CFI/TLI/SRMR/RMSEA/AIC/BIC).
Results: Cases (n=1010) were more often male and older compared to controls (n=656). The reconstructed scales were less correlated than the original scales but still moderately strongly correlated (cases: 0.732 original vs 0.628 Riskind; controls: 0.780 original vs 0.632 Riskind). The 2-factor model produced by EFA did not resemble Riskind's reconstructed scales. A proposed 3-factor solution was similar in cases and controls and used 18 of the original 31 items, accounting for 30% of the variance. The 3 factors represented items concerning 1) internalizing/psychological distress, 2) sleep disturbance, and 3) somatic symptoms. In the sample of cases, internal consistency was deemed adequate for all factors with alpha values ranging from 0.76 to 0.8, average item correlations from 0.28 to 0.4, and average item-scale correlations from 0.61 to 0.70.
Conclusion: The original and reconstructed Hamilton scales were highly correlated and may be ill-suited to differentiate anxiety and depressive symptoms in Parkinson's disease. Riskind's reconstructed scales were not replicated. A new, 3-factor model is proposed that may better align with dimensional understandings of psychopathology and facilitate monitoring of internalizing symptoms independently from somatic symptoms.

Primary Palliative Care for Emergency Medicine, a Stepped-Wedge Cluster-Randomized Trial Across 29 Emergency Departments

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Background: Palliative care interventions in the emergency department (ED) capture high-risk patients at a time of crisis and can improve patient-centered outcomes. Our objective was to test the impact of primary palliative care education, training, and technical support for emergency medicine (PRIM-ER) on ED disposition, health care utilization, and survival in older adults with serious, life-limiting illness
Methods: PRIM-ER was a stepped-wedge cluster-randomized trial designed to administer interventions aimed at improving providers' palliative care practices across 29 EDs in the United States. Our study used Medicare claim records accessed through the Centers for Medicare & Medicaid Services Chronic Conditions Data Warehouse. Patients included were ≥66 years of age, visited 1 of our 29 EDs between May 1, 2018, and December 31, 2022, and had 12 months of prior inpatient, outpatient, and carrier claims — with a Gagné Index of >6 representing a >30% risk of mortality. We used summary statistics and a generalized additive model to estimate the effect of our primary outcome, which was ED disposition to an acute care setting (Yes/No) in the 6 months following initial ED visit.
Results: We identified 98,922 initial visits, with 52% occurring during the baseline period and 48% in the intervention period. Mean age was 78 years (standard deviation: 8.4), 50% of patients were female, 78% were White, and the average Gagné score was 9.0 (standard deviation: 2.2); 63% of the patients had an inpatient admission during the baseline period and 62% in the intervention period. After adjusting for naturally occurring changes over time, there was no difference between acute care admission in the intervention period (odds ratio: 0.94, 95% CI: 0.84–1.05) compared to the baseline period.
Conclusion: Unlike the strong evidence base for specialty palliative care, this multilevel, complex primary palliative care intervention in 29 EDs did not demonstrate an impact on health care utilization in older adults at high risk for short-term mortality.

Emergency Department-Initiated Nurse-Led Telephonic Case Management vs Specialty Outpatient Palliative Care for Older Adults With Serious Illness

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Background: Outpatient palliative care is a limited resource that improves patient-centered outcomes, yet the comparative effectiveness of two predominant care models is unknown. We compared the effectiveness of emergency department (ED)-initiated nurse-led telephonic case management to specialty outpatient palliative care toward quality of life (QOL), symptom burden, loneliness, and health care utilization.
Methods: Emergency Medicine Palliative Care Access (EMPallA) was a pragmatic randomized clinical trial conducted at 18 EDs comprising persons ≥50 years of age with advanced cancer or end-stage organ failure. Patients were randomized to nurse-led telephonic case management or outpatient palliative care. Summary statistics and mixed-effects models with multiple imputation with chained equations were used to assess change in QOL. Secondary analyses evaluated the change in 1) symptom burden, 2) loneliness, and 3) health care utilization (ie, ED revisits, inpatient days and hospice utilization) during 12 months of follow-up. Preplanned exploratory analyses evaluated intervention effects by disease type, functional status, and racial/ethnic subgroups.
Results: Based on 1283 patients with complete data at baseline, mean age was 67 years (standard deviation: 10.1), 671 (52%) were female, 404 (32%) were Black, 459 (36%) had advanced cancer, and 281 (22%) required at least considerable assistance. After adjusting for baseline QOL, the estimated difference between the intervention groups in average QOL score 6 months postenrollment was 0.71 points (95% CI: -1.19, 2.61). Additionally, there were no differences between groups in secondary outcomes or in subgroup analyses.
Conclusion: These two care models had a similar impact on QOL, symptom burden, loneliness, and health care utilization in seriously ill older adults after an ED visit. Health systems should consider a centralized nurse-led telephonic model staffed by nurses to expand the reach of traditional clinic-based palliative care. New payment models should be explored to reimburse this care.

Frequency of Core Features of Lewy Body Dementia Among Patients Diagnosed With a Nonspecific Dementia Syndrome and Associated Care Utilization

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Background: Lewy body dementia (LBD) is the costliest form of dementia, likely due to a complex set of core features including parkinsonism, dream enactment behavior, fluctuating cognition, and visual hallucinations. Underdiagnosis is common, and studies to date may underestimate the impact of LBD. We examined utilization rates among patients with unspecified dementia (NOS) with 1 or more symptoms of LBD.
Methods: All member-patients diagnosed with NOS were identified using ICD-10 codes in the Virtual Data Warehouse between October 2015 and June 2022. The presence of any of the 4 core clinical features in the year before first dementia (index) diagnosis, as established by Espinosa et al in 2020, were then identified. Patient demographics and multimorbidity were compared between those with 0, 1, and ≥2 core clinical features. The number of inpatient hospitalizations (IP) and emergency department encounters (ED) in the 2 years surrounding index diagnosis was characterized within each group and modeled using negative binomial regression with adjustment for patient characteristics.
Results: The majority (68%) of the 1183 eligible member-patients had no clinical features (NOS+0) of LBD, with 28% having 1 feature (NOS+1) and 5% with 2 or more features (NOS≥2). Fluctuating cognition was the most common clinical feature, present in 58% of those with 1 or more feature. NOS≥2 patients were more likely to be younger and male. NOS≥2 patients were more likely to have 5 or more IP (16%) and ED encounters (13%) over the 2 years compared to NOS+0 (IP: 1%, ED: 4%) and NOS+1 (IP: 3%, ED: 8%). Patients with higher numbers of clinical features had significantly higher rates of IP and ED utilization even after adjusting for other patient characteristics. Compared to NOS+0, those with 1 and ≥2 core features had 1.4 (1.2, 1.6) and 2.5 (2.0, 3.1) higher rates of IP hospitalization, respectively. Similar patterns were seen in ED rates.
Conclusion: Only 56 patients (5%) diagnosed with unspecified dementia had ≥2 core features of LBD, a lower frequency than observed by Espinosa et al (16%). LBD disease complexity was positively associated with utilization. Future research will compare the NOS≥2 group to patients with an LBD diagnosis to understand the impact of a specific diagnosis on patient care.

BEHAVIORAL HEALTH

Blood Pressure Control Among Primary Care Patients With Hypertension and Unhealthy Alcohol Use: The Role of Alcohol Brief Interventions

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Background: Hypertension is one of the most prevalent chronic conditions. Unhealthy alcohol use can impact its clinical management and associated cardiovascular disease risks. Alcohol screening and brief intervention (ASBI) is an effective early intervention for unhealthy alcohol use, yet its effectiveness in real-world primary care settings remains unclear.
Methods: Using electronic health record (EHR) data, we emulated a pragmatic clinical trial to evaluate the effects of receiving a brief intervention (BI) on drinking and blood pressure (BP) outcomes among patients with hypertension and unhealthy alcohol use. This observational study identified 72,979 patients with hypertension who screened positive for unhealthy drinking between January 1, 2014, and December 31, 2017. We used a target trial framework to compare the effects of receiving BI (intervention) to not receiving BI (comparison) on drinking (change in heavy drinking days [HDD] and drinks/week) and BP outcomes (changes in diastolic and systolic BP) from baseline to 2- and 5-year follow-up. Treatment effect estimates were obtained using inverse probability weighted models.
Results: At 2 years, the intervention group had about 0.2 fewer HDDs (mean difference [95% CI]: -0.21 [-0.37, -0.04]) and about 0.1 fewer drinks/week than the comparison group (mean difference: -0.10 [-0.21, -0.01]). At 5 years, patients who received BI had about 0.1 fewer HDDs at 5 years (mean difference: -0.10 [-0.20, -0.01]) compared with those who did not. At 2 years, patients who received BI if screened positive had an additional -0.5 mmHg decline in diastolic BP (mean difference: -0.54 [-0.79, -0.32]) and an additional -0.7 mmHg in systolic BP (mean difference: -0.72 [-1.09, -0.38]) compared with those who did not. The intervention group also had 8% and 6% higher odds of having a ≥3 mmHg reduction in diastolic and systolic BP, respectively, than the comparison group (adjusted odds ratios [95% CI] of 1.08 [1.05, 1.13] and 1.06 [1.02, 1.11], respectively).
Conclusion: Findings from this emulated pragmatic trial leveraging health care data generated from routine primary care are informative for understanding effects of ASBI in a diverse population of adults with hypertension and contribute to the growing evidence base on the impact systematic ASBI can have on population-level drinking and hypertension outcomes.

Pragmatic Pilot Trial to Increase Suicide Screening in U.S. Primary Care Clinics

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Background: Individuals with opioid use disorder (OUD) are at increased risk of suicide. In a study implementing an electronic health record (EHR)-integrated clinical decision support (CDS) tool designed to prompt diagnosis and treatment of OUD in primary care, we received supplemental funding to incorporate decision support to guide structured assessment of suicide risk for patients with OUD.
Methods: 15 primary care clinics were randomized to receive a CDS tool that alerted clinicians when adults with OUD were estimated to have elevated suicide risk using machine-learning risk models. Clinicians were prompted to complete a Columbia Suicide Severity Rating Scale (CSSRS), and CSSRS completion was the primary outcome. Mental health (MH) engagement was a secondary outcome and defined as a MH visit or a primary care visit associated with a MH diagnosis. MH engagement adequacy was determined by CSSRS score, with higher scores requiring earlier follow-up, or if missing, item 9 of the Patient Health Questionnaire-9. Linear mixed log-binomial regression models predicted the likelihoods of CSSRS completion and adequate MH engagement.
Results: A total of 115 primary care patients met inclusion criteria, with 57% women and a mean age of 39.3 years (standard deviation [SD]: 12.1); 81% were White, and 83% were insured by Medicaid. Similar proportions of intervention and control patients (20.3% vs 17.3%; P=0.70) completed a CSSRS within 14 days of the index visit. The proportion of patients with adequate MH engagement was 88% for intervention patients and 87% for control patients. The average number of days elapsed from one visit until the next was similar for control (19 [SD: 30] days) and intervention (16 [SD: 26] days) patients.
Conclusion: The intervention had no impact on suicide prevention process measures and relatively low rates of CSSRS completion in both groups. Somewhat reassuringly, the vast majority of patients had adequate MH follow-up for their estimate level of acute suicide risk. Our findings suggest a more robust intervention is needed to increase suicide prevention process measures, including use of the CSSRS.

Navigating the Terrain: Understanding Palliative Care's Impact on Mental Health Services in Pancreatic Cancer

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Background: Palliative care has shown effectiveness in addressing the physical and mental symptoms of complex chronic illnesses. However, little is known about the impact of palliative care on the mental health (MH) of individuals with pancreatic cancer. This study aimed to investigate the influence of palliative care consultation on the utilization of MH services and pharmacotherapy within this particular population.
Methods: We conducted a retrospective cohort study on individuals with newly diagnosed pancreatic cancer (PanCa) in 2010–2018 using Optum's de-identified Integrated Claims-Clinical dataset. The de-identified dataset links administrative claims and clinical data from providers across the continuum of care. To qualify newly diagnosed cases, the cohort required 6 months' activity prior to the first PanCa diagnosis in the database. We sought to identify diagnosis of anxiety, depression, or both subsequent to the PanCa diagnosis and to investigate the impact of palliative care consultation following the PanCa diagnosis to the utilization of MH services and pharmacotherapy for individuals with these particular MH conditions.
Results: Among the 4029 individuals with newly diagnosed PanCa in our sample, 80.5% were non-Hispanic White and

mean age of PanCa diagnosis was 68 years. Compared to those without palliative care consultation, those with consultation had significantly higher percentage of Black race, residence in Midwest, and prevalences of depression (33.9% vs 22.8%) and anxiety (36.2% vs 23.2%). The utilization of MH services and pharmacotherapy varied based on the MH diagnoses, with patients experiencing both anxiety and depression showing highest utilizations of any treatment. Treatment pattern was influenced by age (adjusted odds ratio of 1.832 for age <55 vs 65–70 years) and region (adjusted odds ratio of 0.458 for living in South vs Northeast). Notably, palliative care consultation did not significantly impact the tendency of either type of treatment.

Conclusion: This study underscores the lasting underutilizations of palliative care and MH care among patients with PanCa and identifies pertinent vulnerable patients such as those older than age 70 and having mild/moderate MH issues. Our findings will provide valuable insights for providers to make informed decisions regarding patient-centered care for aggressive cancers.

Peer vs Professional Telephonic Coaching to Support Online Mindfulness-Based Cognitive Therapy for Prevention of Perinatal Depression Recurrence: A Randomized Trial

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Background: Mindfulness-based cognitive therapy (MBCT) can prevent perinatal depression. Online delivery (Mindful Mood Balance [MMB]) expands access but may require coaching to promote patient engagement. Peer coaches may overcome limited availability of mental health professionals. This study compared depression outcomes for MMB telephonically supported by trained peers vs mental health professionals.

Methods: A randomized noninferiority trial was used to compare the clinical effectiveness (intervention engagement and depressive symptom reduction) of MMB, an 8-session online program. Women with a history of depressive episodes (N=423) but not currently depressed and who were receiving prenatal care at 1 of 4 study sites — Kaiser Permanente (KP) Colorado, KP Georgia, KP Southern California, or HealthPartners in Minnesota — were recruited and randomized to participate in the MMB program supported by either trained peers with lived experience of perinatal depression (N=2) or mental health professionals (N=3). Primary outcomes included the number of MMB sessions completed and depression symptoms (mean PHQ-9 scores) at 3 months postrandomization.

Results: Participants randomized to peer or professional coaching were equivalent at baseline on age, education, income, race/ethnicity, and prior depressive episodes. Baseline mean PHQ-9 scores were equivalent for the peer (5.11) vs professional (4.97) coaching arms. Mean MBCT sessions completed for peer vs professional coaching arms were equivalent (4.69 vs 4.91; P=ns), as were mean satisfaction with coaching scores (25.94 vs 24.96; P=ns). Although both groups showed significant reductions in PHQ-9 scores from baseline to 3-month postrandomization (F=60.36; P<0.0001), there was a significant group by time interaction showing greater reductions for those receiving peer coaching (F=4.82; P=0.029). Moreover, 74% of both groups were in remission (PHQ-9 of <5) at 3 months postpartum compared to 40% at baseline.

Conclusion: Whether supported by trained peers or mental health professionals, engagement and satisfaction with MMB were equivalent. Both groups had significant reductions in depressive symptoms at 3 months postrandomization, with greater reductions for peer coaches. Accounting for the limitation of a relatively small number of coaches studied, peer-supported online MBCT appears to be effective.

Cause-Specific Hospitalizations Among People With Diabetes Who Received Treatment for Substance Use Disorder

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Background: Substance use disorders (SUDs) are highly comorbid with behavioral and general medical conditions; they also complicate management of chronic illnesses such as diabetes. Addiction treatment presents an opportunity to address multifaceted health needs among people with co-occurring SUD and diabetes, but there is limited understanding of the most critical health risks faced by this population.

Methods: We examined cause-specific hospitalizations, including diabetes, chronic pain, chronic liver disease, and psychiatric hospitalizations, among patients with co-occurring diabetes and addiction treatment versus patients with diabetes but no SUD. We also compared blood sugar and blood pressure control. All patients completed at least 1 outpatient addiction medicine or other health care visit at a Kaiser Permanente Northern California facility between 2016 and 2021. Demographics were descriptively analyzed. Modified Poisson models compared outcomes across the 2 groups, controlling for age, sex, race/ethnicity, Medicaid insurance, neighborhood deprivation, and index year.

Results: Patients with co-occurring diabetes and SUD (N=4788) compared to those with diabetes and no SUD (N=269,016) were more often male (71% vs 52%), younger (55 vs 63 years), non-Hispanic White (53% vs 41%), a current or former smoker (60% vs 36%), and diagnosed with a mood disorder (45% vs 12%). In adjusted analyses, co-occurring SUD was associated with elevated hospitalizations for diabetes (adjusted risk ratio [aRR]: 2.57, 95% CI: 2.37–2.79), chronic pain (aRR: 7.52, 95% CI: 6.53–8.67), and chronic liver disease (aRR: 9.42, 95% CI: 8.18–10.85), and psychiatric care (aRR: 7.26, 95% CI: 6.56–8.04). The co-occurring diabetes and SUD group had similar blood sugar control, ie, hemoglobin A1c of <8% (aRR: 1.09, 95% CI: 1.06–1.11), and blood pressure control, ie, <140/90 (aRR: 1.02, 95% CI: 1.01–1.03), compared to those with diabetes and no SUD.

Conclusion: Relative to other patients with diabetes, those who have a SUD face greater hospitalization risk for a wide range of health conditions despite similar metabolic care measures. Additional clinical attention may be warranted for this vulnerable population of patients with diabetes.

Depression Screening and Diagnosis Among Adolescents 11–17 Years Old in an Integrated Health System and Potential Disparities

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Background: Guidelines have been developed for depression screening for adolescents in primary care. This study assessed the link between depression screening and diagnosis and potential disparities at Kaiser Permanente Southern California (KPSC), where depression screening for youths 11–17 years of age has been implemented at standard well-child and sports physical health visits (WCV).
Methods: Data included 511,434 youths (age 11–17) who were KPSC health plan members with WCV between 2017 and 2021 and no depression diagnosis prior to 2017. All data were extracted from KPSC electronic medical records; depression screening was determined by the administration of PHQ screening; depression diagnosis was determined by ICD codes. Rates also were stratified by gender, race and ethnicity, and estimated household income.
Results: Among these youth, 80.3% had PHQ screening during 2017–2021. Screening rates were comparable across gender, household income, and race and ethnicity, except slightly higher for other gender (84%) and Asian (84%) youth. Among those with PHQ screening, 7.9% had PHQ-9 score of ≥10 — higher in female (11%), other gender (47%), low income (8.3%), multiple races (8.6%), and Native American & Alaskan (8.7%); lower in male (4.9%), Asian (5.6%), and Pacific Islander (6%). For those with PHQ-9 score of ≥10, 41% had depression diagnosis — higher in female (45%), other gender (61%), multiple races (43%), Native American & Alaskan (47%), and White (45%); lower in male (33%), Black (37%), and Pacific Islander (35%); and no appreciable difference by household income. The depression diagnosis rate was <5% among those screened without PHQ-9 of ≥10 or who were not screened.
Conclusion: Our data did not show disparities in depression screening among youth at KPSC who presented for WCV; however, youth who did not present to WCV were not included. Screening with PHQ in primary care can effectively identify youth at risk for depression. Our findings of elevated PHQ screening scores and depression diagnosis for certain subgroups such as female and other gender, multiple races, Native

Association of the Area Deprivation Index and Rurality With Access to Collaborative Care Management

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Background: The collaborative care model (CoCM) is the leading model for integrating behavioral health into primary care for patients with major depressive disorder. However, CoCM requires engagement and ongoing participation. We aimed to assess whether two area-based social determinants of health, the area-deprivation index (ADI) and rurality, were associated with access to and engagement with CoCM.
Methods: This is an observational analysis of Mayo Clinic patients eligible for CoCM from 2008 to 2021: adults ≥18 years of age, empaneled in primary care clinics offering CoCM, with a PHQ-9 of ≥10, and without bipolar disorder. We operationalized ADI as quintiles with Q1 being least deprived and Q5 being most deprived. We operationalized rurality using RUCA codes with two categories: urban and rural. We evaluated participation in CoCM by whether a patient enrolled in CoCM, dropout defined by leaving the program early, and the count of contacts with the care coordinator. We used logistic regression for enrollment and dropout and negative binomial regression for contacts. We controlled for demographics, baseline PHQ-9, comorbid conditions, and use of antidepressants.
Results: We identified 51,418 patients with a mean age of 44.7 years (standard deviation: 19.1). Of these patients, 12.3% (6329) resided in the least deprived quintile (Q1), 21.7% (11,167) resided in the most deprived quintile (Q5), and 32.4% (16,648) resided in rural areas. ADI was not associated with enrollment in CoCM, but rural residency was associated with being less likely to participate (-8.1 percentage points [95% CI: -12.3, -3.8]) compared to urban residency. In contrast, residing in ADI Q5 relative to Q1 was associated with increased dropout (4.8 percentage points [95% CI: 0.8, 8.8]), while residing in rural areas was not significantly associated with dropout. For total contacts, ADI Q5 was associated with an average of 0.66 (95% CI: 0.20, 1.12) and rural status 1.19 (95% CI: 0.21, 2.18) more contacts.
Conclusion: We found that rurality was associated with lower CoCM participation, and high deprivation was associated with greater CoCM dropout. However, we also found that living in high-deprivation neighborhoods and rural areas was associated with more contacts. These findings suggest extra effort on outreach (rural) and on retention (deprivation) may increase participation of these vulnerable patients.

Qualitative Examination of Reasons for Refusal to Participate in a Chronic Noncancer Pain Study (RESOLVE)

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Background: Participant recruitment and enrollment are critical for successful research study implementation. Insight into why individuals decline participation informs future outreach strategies. This analysis assesses accuracy of study staff-selected refusal reasons relayed by Kaiser Permanente members invited to join a study evaluating effectiveness of therapeutic approaches for chronic noncancer pain.
Methods: Members were recruited from February 2021 to February 2023 by mail, email, and phone outreach documented in a secure tracking system. Staff chose 1 of 9 refusal categories and offered optional comments; refusal phone events prior to study eligibility screening were queried. Six categories having ≥100 events with unique descriptions were evaluated by reviewing comments (n=1645) for consistency with/divergence from assigned category or presence of novel information requiring subcategory creation. Patterns of discrepant content were noted in/across categories. Derived decision rules classified events as correct (keep original category) or incorrect (change and/or add category). Correct events were further distinguished by division into new subcategories.
Results: Rates of events classified as correct varied by refusal category: 49.3% (n=404) of Other, Please Specify; 61.2% of Not Interested (n=183); 75.6% (n=176) of Does Not Have Time; 79.2% (n=106) of Dealing with Other Health/Life Issues; 80.6% (n=175) of No Reason Given; and 97.5% (n=601) of Does Not Experience (DNE) Pain/Chronic Pain. Furthermore, in 3 of the 6 categories more than one-third of events classified as correct required restructuring into new subcategories: 84.4% (n=199) of Other; 50% (n=112) of Not Interested; and 36.7% (n=586) of DNE Pain. It is therefore evident that the existing categories did not fully describe refusal motivations sufficiently and accurately. Frequently occurring subcategories pertained to pursuit of other treatments, reduced pain, and objections to/inability to comply with treatment components or study design.
Conclusion: This analysis reveals opportunities to improve study refusal documentation and categorization such as providing operationalized categorical definitions, allowing multiple refusal reasons, and delaying forced choice categorical selection until event descriptions are recorded. Nuanced refusal subcategorization can enhance clarity and precision to inform recruitment strategies for future studies.

Delivering Remote Chronic Pain Self-Management: Lessons Learned From Coaches in a Multisite Trial

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Background: RESOLVE is a multisite comparative effectiveness trial to evaluate remotely delivered cognitive behavioral therapy for chronic pain (CBT-CP). Similar pain coping skills are taught over 8 sessions through 1) self-guided web-based learning, or 2) coaching via telephone/video. We interviewed study health coaches to learn about their experiences and considerations for future implementation.
Methods: Coaches (all with master's level behavioral health training) completed 34 hours of training before coaching participants. All coaching calls were recorded, with a sample reviewed for fidelity. All coaches participated in weekly group supervision sessions. We interviewed all but 1 of the 12 coaches twice, once after they started delivering the intervention and again when they had gained considerable experience near the end of the trial. After obtaining consent, we conducted 60-minute interviews by teleconference, using an interview guide. Transcripts were analyzed thematically to capture content relating to successes and challenges, participant engagement strategies, suggested improvements, and considerations for future implementation.
Results: In-depth training and ongoing supervisory meetings were seen as crucial for competence. Coaches reported few problems with remote coaching and found that patients valued joining sessions from home. Patients often gained immediate benefits from the skills; coaches found this rewarding. Coaches struggled to adapt content from this highly manualized intervention to address specific pain conditions or situations. However, with supervision, practice, and learning from peers, they gained confidence and found ways to personalize intervention delivery. Covering new content while reviewing past skills and assignments within an hour was challenging, particularly as the number of skills to review increased and skills became more cognitive in nature. Coaches suggested changes to session content/timing and adding more check-ins with patients.
Conclusion: Remote delivery of a structured intervention to teach pain coping skills is rewarding for coaches and suits many patients' needs. However, considerable resources must be devoted for training and supervising coaches so they have the confidence and expertise to work effectively. Implementation could be challenging unless this intervention is targeted to the patients who would most benefit from it.

Evaluation of Long-Acting Injectable Antipsychotics on the Risk of Disruptive Life Events in the Year Following First Mental Health-Related Emergency Department Visit or Hospitalization

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Background: Antipsychotics have been the primary treatment for psychosis, but adherence to oral antipsychotics can be poor. Long-acting injectables (LAIs) can replace or supplement oral antipsychotics and may improve adherence. However, there

is limited information on how LAIs may impact the risk of disruptive life events (DLE) such as arrests or bankruptcies.
Methods: The study patient cohort had incident diagnoses of schizophrenia or bipolar I disorder at Kaiser Permanente Southern California in 2007–2018. Two study arms were defined by patient history during the 180 days after first mental health-related emergency department (ED) visit or hospitalization: 1) those receiving oral antipsychotics only, and 2) those receiving LAIs with or without oral antipsychotics. To adjust for imbalances in demographic covariates and diagnoses, we used propensity score matching with a ratio of 3:1. DLE were assessed by TransUnion data in the first year of follow-up, including arrests, judgement, and bankruptcy filings. All-cause mortality also was assessed. Risk difference and relative risk were estimated before and after matching.
Results: The unmatched sample had 3667 in the oral antipsychotic arm and 218 in the LAI arm. Overall, the sample characteristics were 62% male, median age 22 years at initial mental health ED visit/hospitalization, 38.7% Latino, 33.8% White, 17.6% African American, 9.9% others, 53.9% with schizophrenia, and 46.1% with bipolar I disorder. The matched sample had 654 patients in the oral antipsychotic arm and 218 in the LAI arm. Covariate balances were verified with absolute standardized mean differences of <0.1. The matched sample estimates suggested that LAIs were associated with lower overall DLE risk (risk difference: -2.14% [P=0.02]; relative risk: 0.37 [P=0.13]) than oral antipsychotics. Protective estimates were similar between patients with schizophrenia and bipolar I disorder. The unmatched sample estimates had generally similar results.
Conclusion: Few prior studies have investigated the impact of LAIs on DLE in populations of people with serious mental illness. Our study suggests LAIs may have benefits beyond traditionally measured outcomes of mood and psychotic symptoms and may offer protective effects against DLE such as arrests and bankruptcies.

Nausea and Vomiting of Pregnancy Severity and Prenatal Cannabis Use in a Michigan Sample

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Background: Nausea and vomiting of pregnancy (NVP) affects >70% of pregnancies. State-level legalization of cannabis for adult use has likely contributed to the doubling of prenatal cannabis use prevalence in the United States. Though cannabis has well-documented antiemetic properties, there is insufficient research on the topic. Herein, we assess the association between NVP severity and prenatal cannabis use.
Methods: Data were from the Michigan Archive for Research on Child Health (MARCH), a population-based prospective cohort of pregnant patients recruited from 22 clinics in Michigan's lower peninsula. Patients were eligible to participate in the MARCH study if they were initiating prenatal care, ≥18 years old, and able to complete surveys in English. NVP severity was measured using an adapted version of the Pregnancy-Unique Quantification of Emesis & Nausea tool. Cannabis use was measured by asking participants if they had used cannabis at all during their current pregnancy. Data were collected via interviewer-administered phone surveys. Cross-sectional analyses were conducted for data available between October 2017 and January 2022 (n=826).
Results: Findings indicate that 14% of participants (95% CI: 11–16) reported prenatal cannabis use and were, on average, 27 years old. Most participants who used cannabis during pregnancy were non-Hispanic Black, insured under a government health plan, and did not concurrently use alcohol or tobacco. Participants who reported increasing NVP severity had higher odds of using cannabis during pregnancy (odds ratio: 1.2, 95% CI: 1.1–1.2). Upon restriction to first trimester participants, results remained statistically significant. When the direction of the association was reversed, those who used cannabis during pregnancy experienced a modest increase in NVP severity (β: 0.2, 95% CI: 0.1–0.2). Lastly, an analysis of cannabis use in the 3 months before pregnancy suggested an increase in NVP severity during the first trimester (β: 0.1, 95% CI: 0.003–0.2).
Conclusion: Estimates reveal a link between NVP and prenatal cannabis use. Findings contribute to the limited evidence in this area of research. Future studies should employ fine-grained, time-specific measures of NVP and prenatal cannabis use to better understand the cause-effect relationship. This study provides a basis to discourage cannabis use during pregnancy until more evidence becomes available.

CANCER

Racial and Ethnic Disparities in Palliative Care and End-of-Life Care Among Patients With Advanced Cancer

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Background: Planned study findings suggest that a social worker-led intervention to improve goals of care discussions was associated with higher rates of palliative care use and comparable rates of end-of-life care among patients with cancer. We now explore whether there are potential racial and ethnic disparities in palliative care and end-of-life (EOL) care among patients with advanced cancer.
Methods: This retrospective observational study identified patients with advanced cancer from August 2019 to March 2021 using electronic health records from a health system in Northern California. We analyzed outcomes occurring in the first 6 months following identification (ie, palliative care referrals and visits, advance care planning [ACP]) and, among

patients deceased by March 2022, EOL outcomes (ie, hospice use at any time, 1 or more emergency department [ED] visits or 1 or more hospitalizations within 30 days of death). Multivariate logistic regressions assessed the associations of self-reported race/ethnicity, sex, and age with outcomes, adjusting for intervention participation and patient/clinical characteristics and accounting for clustering within providers.

Results: Of 784 patients analyzed, 25% had palliative care referrals, 20% palliative care visits, 14% ACP. They were 17% Asian, 3% Black, 67% White, 15% Other/unknown race, 8% Hispanic ethnicity, 44% female, and 22% >80 years old. Among 411 decedents, 60% received hospice care, 25% had EOL ED visit, and 32% had hospitalization within 30 days of death. Black and White patients had similar outcomes, except Black patients (vs White) had higher odds of EOL ED visit (odds ratio [OR]: 3.82, 95% CI: 1.62–8.96). Hispanic (vs non-Hispanic) patients had higher odds of palliative care referrals (OR: 1.84, 95% CI: 1.17–2.90), palliative care visits (OR: 1.86, 95% CI: 1.19–2.92), and EOL hospitalization (OR: 2.27, 95% CI: 1.05–4.90). Patients over age 80 (vs ≤65) had lower odds of EOL hospitalization. Female sex was positively associated with palliative care referrals and ACP and negatively associated with EOL hospitalization.

Conclusion: In our study cohort, racial/ethnic differences were observed in palliative care use, end-of-life ED visit, and end-of-life hospitalization, but not in ACP or end-of-life hospice use. Further understanding these differences will require both additional quantitative and qualitative study.

CHRONIC PHYSICAL ILLNESS

Palliative Care Gaps in Acute Heart Failure: Understanding From a Nationwide All-Payer Database in the United States

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Background: Current guidelines advocate for palliative care in the treatment plan for all patients with heart failure (HF). Despite a growing acceptance of palliative care, there is limited understanding of palliative care uptake hutering acute HF. This study aims to investigate palliative care consultations in relation to clinical markers of acute HF among patients newly diagnosed with HF in the United States.

Methods: We identified adult patients with newly diagnosed HF (NDHF) in Optum's de-identified Integrated Claims-Clinical dataset in 2010–2018. Our investigation involved analyzing the duration from the initial HF diagnosis to the first palliative care consult (PCC), with censoring at the date of heart transplantation or last activity in the electronic health record. The duration was modeled using Cox proportional hazards regression, controlling for clinical markers of acute HF such as intravenous inotropic therapy, cardiogenic shock, mechanical circulatory support, implanted cardioverter-defibrillator (ICD), HF hospitalization, and advanced HF. Additionally, patient demographic factors, comorbidities, and provider characteristics were considered in the analysis.

Results: A total of 16,198 patients with NDHF received palliative care between 2010 and 2018. The overall rates of first PCC within 3 and 5 years were 13.1% and 18.3%, respectively, with a median time of 244.5 days (interquartile range: 9–904) from HF diagnosis to the first PCC. Factors such as older age, White race, and having Medicare, Medicaid, or both as the primary payer were associated with a higher likelihood of receiving palliative care. Noticeably, prior incidences of cardiogenic shock (adjusted hazard ratio [95% CI]: 2.6 [2.4, 2.8]), ICD (5.7 [5.3, 6.1]), and advanced HF (2.1 [1.9, 2.2]) increased the probability of receiving palliative care, while the use of inotropes and a diagnosis of anxiety were negatively related. Geographically, there was variation in palliative care receipt, with the lowest uptake in the South and highest in the West.

Conclusion: The integration of early palliative care for HF in the United States is currently limited. Although clinical guidelines advocate for palliative care evaluation both before and after advanced treatment for acute HF, there are notable gaps in conducting PCCs for patients undergoing acute HF. Future research should focus on developing strategies to enhance the early adoption of palliative care for acute HF.

Developing a Rule-Based Algorithm to Identify Recurrent Non-Hodgkin Lymphoma

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Background: In this project, we aim to develop rule-based and machine learning-based algorithms to identify recurrent cases of two common subtypes of non-Hodgkin lymphoma — diffuse large B-cell lymphoma (DLBCL) and follicular lymphoma (FL) — in electronic health record (EHR) data. Herein, we present early findings from the rule-based algorithm.

Methods: Incident DLBCL and FL cases (2000–2018) were identified in tumor registry data from the Virtual Data Warehouse (VDW), a distributed standardized repository of EHR and claims-based datasets housed at 2 study sites participating in the HCSRN. We compiled a comprehensive list of pharmacy (NDC) and procedure codes (HCPCS, CPT) to indicate when each patient started first-line treatment, capturing dispensed drugs, administration of such drugs, and related processes. We defined recurrent cases as those who completed first-line treatment followed by a gap of ≥6 months with no treatment-related codes and a later restarting of treatment codes.

Results: Site A identified 225 patients (137 DLBCL, 88 FL). The mean age at diagnosis was 70.7 years for DLBCL and 66.5 years for FL. Mean follow-up time postdiagnosis was 3.8 years for DLBCL and 5.2 years for FL. At site A, 23 patients with DLBCL and 19 patients with FL met criteria for recurrent disease, with a mean of 3.4 years from diagnosis to first recurrence. At site B, 392 patients were identified (246 DLBCL, 146 FL). The mean age at diagnosis was 65.7 years for DLBCL and 63.6 years for FL. Mean postdiagnosis follow-up time was

5.8 years for DLBCL and 8.4 years for FL. At site B, 49 patients with DLBCL and 48 patients with FL met criteria for recurrent disease. A chart review at site B is underway to validate the results of the rule-based algorithm and identify unstructured text for inclusion in the machine learning-based algorithm.
Conclusion: The number of recurrent cases identified by the algorithm are in line with clinical expectations. We have developed a REDCap-based chart abstraction form and will review 150 randomly selected EHRs from site B to assess the validity of the algorithm and refine it before applying it to VDW data from a third HCSRN study site.

Trauma, Metastatic Cancer, and Physical Abuse: Unveiling the Interplay of Risk Factors in a Nationwide Analysis

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Background: We aimed to explore the complex relationship between the presence of metastatic cancer or undergoing cancer chemotherapy in adults with moderate to severe trauma and their likelihood of experiencing physical abuse. We seek to understand how these specific health conditions might influence vulnerability to abuse, thereby addressing a significant gap in the existing literature.
Methods: We utilized retrospective data from the Trauma Quality Programs Participant Use File from 2017 to 2019 (N=27,531). Our study outcome was the report of physical abuse (no/yes). We focused on adults (≥18 years of age) diagnosed with moderate to severe trauma (Injury Severity Scale range of 9–75) who either had metastasized cancer (exposure) or were currently receiving chemotherapy (intervention), adjusting for predisposing factors (age, gender, race and ethnicity, method of payment, facility levels) and need for care factors (intensive care unti length of stay and comorbid conditions). We used descriptive statistics, Fisher's exact test, chi-squared analysis, and logistic regression models using Stata 18, with a statistical significance of $P \leq 0.05$.
Results: We found that 0.19% of 27,531 overall patients reported physical abuse, and among those with moderate to severe trauma, 16,261 (0.16%) reported physical abuse. Among these, a substantial majority with disseminated cancer reported abuse compared to those without disseminated cancer (84.62% vs 15.38%; P=0.040). Patients receiving chemotherapy reported less frequent physical abuse than those not receiving it (26.92% vs 73.08%; P=0.045). In the adjusted model, patients with disseminated cancer had significantly higher odds of reporting physical abuse than those without disseminated cancer (odds ratio: 7.847, 95% CI: 1.021–60.337; $P<0.05$).
Conclusion: Our findings highlight a complex relationship between metastatic cancer, chemotherapy, and abuse risk in patients with trauma. Specifically, patients with metastasized cancer appeared more vulnerable to physical abuse, while those undergoing chemotherapy were less likely to report abuse. This study emphasizes the need for tailored approaches in trauma care to protect this vulnerable group.

Health-Related Quality of Life and its Associated Factors in Patients With Prostate Cancer

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Background: Prostate cancer (PCa) is the second leading cause of cancer death in men. Understanding potential risks and benefits of treatments will help men and their families make informed decisions about prostate cancer. The purpose of the study was to examine the differences in posttreatment quality of life (QOL) across types of treatment and explore the factors that explain observed differences.
Methods: Survey data were collected from 1793 patients with newly diagnosed prostate cancer at a large health system in the San Francisco Bay Area at baseline, 6-month, and 12-month posttreatment follow-up between June 9, 2016, and September 30, 2019. Types of treatment included hormone therapy (androgen deprivation therapy, or ADT), radiation (IMRT, EBRT, and/or prostate brachytherapy), minimally invasive treatment (HIFU or cryotherapy), surgery (dVP), and active surveillance (AS). The QOL was compared across types of treatment using ANOVA. Multiple linear regression was used to examine the factors associated with 5 QOL domains (urinary incontinence, urinary irritative/obstructive, bowel, sexual, vitality/hormonal) and an overall QOL score.
Results: All treatments, except those deemed minimally invasive (only 9 cases), had less urinary incontinence compared to surgery at 6 months. The AS group had less sexual symptoms compared to surgery at 6 months. Both hormone therapy and radiation had more bowel symptoms compared to surgery at 6 months. The benefit of surgery became more salient at 12 months, as it was significantly associated with reduced irritation/obstruction compared to almost all treatments. Hormone therapy had higher vitality/hormonal and overall symptoms, while radiation had higher bowel symptoms compared to surgery at 12 months. Other risk factors of lower QOL included older age, being identified as non-Hispanic Black or "other race," Medicare insurance, obesity, severe comorbidities, more advanced-stage diagnoses, and first-degree family history of cancer.
Conclusion: The choice of treatment can have a substantial impact on patients' posttreatment QOL, with hormone therapy, radiation, and AS appearing to offer higher QOL at 6 months while surgery offers higher QOL at 12 months. Areas of opportunity include senior patients, racial/ethnic minorities, obese patients with Medicare insurance, severe comorbidities, and first-degree family history of cancer.

Results From the ORCHID Study: Observed Role of Cooling on Hemodynamics in Inpatient Dialysis

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Background: Cardiovascular mortality rates are 10–30 times higher for patients receiving hemodialysis (HD). Cooling dialysate reduces intradialytic hypotension (IDH) in outpatient settings, but its effect is unknown in hospitalized patients. This study characterizes the frequency of IDH during inpatient HD and assesses the impact of cooling dialysate to better understand the risk of rehospitalization and death.
Methods: In 2022, 6 Kaiser Permanente Southern California medical centers participated in a 6-month prospective nonrandomized study. Each center acted as their own control, with sites assigned to either the standard 37.0°C or the cooler 35.5°C for the first 3 months and then switching. HD sessions from the first hospitalization (n=3954) and patient (n=1159) data were collected from electronic health records and analyzed using multivariable repeated measures (HD sessions), survival (death), Fine and Gray (rehospitalization [ie, inpatient hosptialization [IP], emergency department vist [ED], ED/IP]), robust Poisson (total hospitalization count and total hospital days), and multivariable regression (30 days at home). Outcomes were risk of IDH, risk factors for IDH, and 30-day rehospitalization and mortality.
Results: Lower starting dialysate temperature was associated with a 16% decreased risk of IDH, while body mass index of <18.5 and age of ≥75 years were both associated with 30%–57% increased risk of IDH. For the patient-level model we used a 30-day follow-up period, and there were several statistically significant outcomes impacted by having IDH during the index inpatient HD session: 1) twice the risk of death; 2) 68% more risk of hospital readmission; 3) 3 times higher risk of a hospice referral; 4) higher hospital days; and 5) less days at home. In healthier patients with Elixhauser score of <11, we observed lower starting dialysate was associated with decreased rehospitalization risk — 0.89 (0.67–1.17) for ED/IP, 0.84 (0.58–1.21) for IP, and 0.82 (0.61–1.10) for ED — and rehospitalization count and days were 0.79 (0.56–1.12) and 0.97 (0.58–1.61), respectively.
Conclusion: Reducing the temperature in inpatient HD was effective in lowering the risk of IDH in acutely ill hospitalized patients. Inpatient IDH was associated with high risk of death, readmission, longer hospitalization, and fewer days at home. In a select population of healthier patients (Elixhauser of <11), the benefit in reducing risk factors for IDH was more pronounced.

Observed Risks Among Hospitalized Patients With Intradialytic Hypotension

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Background: Hemodialysis procedure in end-stage renal disease (ESRD) is complicated by acute blood pressure drops known as intradialytic hypotension (IDH). IDH may impair end-organ perfusion, reduce the efficacy of the dialysis procedure, and increase morbidity and mortality. IDH can occur in up to 40% of all treatments, and the effects of IDH in inpatient settings is unknown.
Methods: A total of 3243 patients with ESRD who received hemodialysis during their first hospitalization in 2019 (index hospitalization) were followed for 12 months at Kaiser Permanente Southern California. We used multivariable analysis to examine their 30-day and 12-month follow-up outcomes: readmission (inpatient admission [IP], emergency department visit [ED], and combination), total hospitalization counts/days, 30-days-alive-at-home, hospice referral, and death. Covariates included in the models were demographic information (age, sex, and race/ethnicity), characteristics during index hospitalization (IDH; dialysis access type, length of stay, and medical service area), prior health service utilization, and prior comorbidity (body mass index, Elixhauser index, and dialysis history).
Results: For 30-day follow-up, adjusted Fine and Grays subdistribution hazard ratios (aHR) for IDH vs non-IDH readmission were 1.21 (1.05–1.40) for IP, 1.19 (1.04–1.35) for ED, and 1.20 (1.06–1.35) for combination. At 30 days, risk reduction per aHR for total hospitalization counts was 1.18 (1.03–1.36) and for total hospitalization days was 1.21 (1.00–1.47); aHR for hospice referral and death was 1.01 (0.53–1.96) and 1.86 (1.32–2.62), respectively. Mean (standard deviation) 30-days-alive-at-home was 28.41 (0.49). For 12-month follow-up, aHR for readmission in IDH vs non-IDH were 1.08 (0.98–1.18) for IP, 1.00 (0.91–1.09) for ED, and 1.03 (0.95–1.13) for combination. At 12 months, aHR for total hospitalization counts was 1.15 (1.05–1.27) and for total hospitalization days was 1.36 (1.16–1.59); hospice referral aHR was nonsignificant at 1.12 (0.85–1.48), but aHR for death was significant at 1.45 (1.25–1.69).
Conclusion: IDH remains a challenge in delivering dialysis treatments. Based on our results, IDH was associated with more frequent and prolonged rehospitalizations. It also significantly increased both 30-day (short term) and 12-month (longer term) mortality rates. Further work is warranted to identify factors amenable to change to minimize IDH.

Patient-Reported Shared Decision-Making and Intentions to Engage in Treatment in a Randomized Trial for Weight Loss Clinical Decision Support

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Background: Clinical decision support (CDS) tools may increase uptake of efficacious and underused approaches to treat obesity in people with type 2 diabetes mellitus, such as

metabolic bariatric surgery (MBS) and antiobesity medications (AOM). This study tested whether a weight loss CDS can increase the frequency of weight loss discussions, shared decision-making (SDM), and intentions to engage in treatment.
Methods: We conducted a cluster-randomized clinical trial of an electronic health record-linked CDS tool for weight loss in patients with type 2 diabetes mellitus in 38 primary care clinics at HealthPartners. Clinics received enhanced decision support for weight loss treatments (including AOM and MBS) or usual care. Patients were identified as having a study-eligible encounter and were randomly selected to complete a survey 1–2 weeks after their first encounter with the CDS. Patients reported on discussions about weight with primary care clinicians, SDM using the Shared Decision-Making Questionnaire-9, and intentions to engage in weight loss strategies. Analyses included logistic regression, general linear models, and cumulative logistic regression.
Results: Patients (N=335, 25% survey response rate) were 60% female, 54% White, 22% Black, and 15% other or multiple races. Mean age was 56.6 years (standard deviation [SD]: 12.8), and mean body mass index was 41.4 kg/m^2 (SD: 5.8). Most patients (79%) reported they were trying to lose weight. Patients reported high rates of discussions about weight (63%), which did not significantly differ by treatment group (P=0.82). Although patients in the intervention group reported better quality SDM (mean: 52.2, SD: 31.3) than patients in the control group (mean: 47.9, SD: 32.0), these results were not statistically different (P=0.24). Patients reported greatest intentions to engage in lifestyle treatments (81% moderately or very likely), with fewer intending to engage in formal weight loss programs (54%), use AOMs (41%), or pursue MBS (13%). Intentions did not differ across groups (P>0.10 for all comparisons).
Conclusion: The CDS intervention did not increase frequency of weight loss discussions or improve patient-reported SDM, despite relatively high intentions to lose weight. Patients have highest intentions to engage in lifestyle changes, followed by AOM and then MBS. Other strategies may be needed to improve the quality of SDM about weight in primary care settings.

CLINICIAN BURNOUT

Clinician's Electronic Health Record Utilization Phenotypes and Association With Clinician Burnout

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Background: Clinicians have reported increased and persistent burnout since the onset of the COVID-19 pandemic. The electronic health record (EHR) has been identified as a potential main driver of burnout. However, clinicians' EHR usage patterns vary significantly, and it is still unclear whether and to what degree the observed burnout is associated with EHR usage patterns.
Methods: We examined clinicians across specialties in a large medical foundation at Sutter Health, utilizing 15 EHR vendor (Epic Signal)-generated variables related to EHR usage patterns. These variables are standardized to their z-score. We applied an unsupervised machine learning technique, "k-means clustering," to identify clinician EHR usage phenotypes, normalized to 8 hours of scheduled patient time. The optimal number of clusters was determined using the within-cluster sum of squares (SoS) and silhouette scores. The model was developed with data from October 2022 and validated using December 2022 data. We compared burnout scores collected from a clinician well-being survey from October 2022 and other clinician-level characteristics across phenotypes.
Results: Based on the EHR use data, we identified 4 unique EHR use patterns among 1418 clinicians. Cluster 3 clinicians spent more than twice the time in InBasket and more time outside scheduled hours; they also had the highest burnout, highest proportion (79%) of females, and were mainly pediatricians and OB/GYNs. Cluster 4, with a majority of family or internal medicine clinicians, had longer time spent in notes, orders, clinical reviews, and overall time in the EHR, with 45% clinicians reporting high burnout. Clinicians in consultation-heavy specialties (eg, psychiatry) were in cluster 2, with longest note length but lowest burnout. Cluster 1 featured shortest documentation and program note length, shortest time in notes and in orders, but highest disease burden in their empaneled patients; reported burnout was 46%.
Conclusion: We identified 4 distinctive phenotypes based on EHR use pattern among clinicians, where clinicians spend time differently on different clinical tasks across different phenotypes. Burnout level also differed across phenotypes, implying burnout may be related to EHR use pattern. Strategies that are designed based on EHR use pattern might be more effective in reducing EHR-related burnout.

DATA ANALYTIC METHODS

Disparities in 1-Year Hospitalization and Association Between Guideline-Directed Medical Therapy and Admission Among Patients Who Have Heart Failure With Reduced Ejection Fraction

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Background: Guideline-directed medical therapy (GDMT), recommended for patients who have heart failure with reduced ejection fraction (HFrEF), can significantly reduce hospital admission and readmission. However, GDMT uptake is still low. We used real-world data to understand the association between GDMT medication use among patients with HFrEF and their 1-year admission in a large health system.
Methods: Electronic health records (EHR) were used to identify the first HFrEF evidence denoted as index date (by ICD-10 codes or ejection fraction of <50%) for patients seeking care from October 31, 2020, to November 1, 2022. We used 1-year look-back period before the index date to identify

baseline characteristics and GMDT prescriptions. We used a weighted GDMT scoring method to indicate GDMT use, for which angiotensin receptor-neprilysin inhibitor, sodium-glucose cotransporter-2, and beta blocker were assigned weight of 2 and mineralocorticoid receptor antagonist and angiotensin-converting enzyme inhibitors/angiotensin receptor blockers were assigned weight of 1. We then categorized GDMT score as 0 (no GDMT), 1–4 (insufficient GDMT), and ≥5 (sufficient GDMT). Survival analysis was conducted to assess the association between GDMT and 1-year all-cause admission, adjusted with other baseline characteristics.
Results: Of 14,404 patients with HFrEF in the study, 42% had hospital admission within 1 year. Disparities in race/ethnicity and insurance were found. Non-Hispanic Black (NHB) patients were more likely to be hospitalized than non-Hispanic White (NHW) patients (55% vs 41%), hospitalization was higher in patients with Medicaid/Medi-Cal than those with Medicare or commercial insurances (58% vs 44% vs 29%). Overall, 52% of patients had no GDMT, 28% had insufficient GDMT, and 20% met GDMT goals. After adjusting baseline covariates, NHB patients were 49% more likely to be hospitalized than NHW (hazard ratio [HR]: 1.49 [95% CI: 1.38–1.61]). Having sufficient GDMT (score of ≥5) was associated with significant hospitalization reduction (HR: 0.54 [95% CI: 0.50–0.58]) than no GDMT. Patients with insufficient GDMT had significantly reduced hospitalization risk than patients without GDMT (HR: 0.65 [95% CI: 0.61–0.69]).
Conclusion: Disparities exist in all-cause hospitalization for HFrEF across different race/ethnicity groups. GDMT has remarkably reduced 1-year hospitalization for patients with established HFrEF. Strong dose effect implies that strategies are needed to maximize GDMT to effectively reduce hospitalization, particularly improving use of GDMT among NHB patients.

Identifying Caregivers of Persons Living With Dementia Using Electronic Health Record Data

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Background: Caregivers for people living with dementia (PLWD) can include family, friends, and neighbors, making up a caregiving social network. Identifying caregivers through the electronic health record (EHR) is challenging. The objective of this research was to combine structured and unstructured EHR fields to comprehensively capture caregiving information across the caregiving network.
Methods: We identified PLWD (≥18 years of age) from Kaiser Permanente Colorado (KPCO) from January 1, 2020, through November 2, 2022, with an active diagnosis of dementia with behavioral disturbances and with 1 or more in-person or telehealth visits after the initial date of the ICD code added to their problem list. This exploratory work used two primary data sources: 1) the KPCO EHR; and 2) the Virtual Data Warehouse for unstructured patient notes, patient portal data, and structured patient contact data. A list of caregiver key terms combined with name matching was also used to identify caregivers in unstructured text.
Results: Of the 792 PLWD identified, 752 (95%) had at least 1 caregiver name listed in a structured field (mean: 2.1), termed here a named agent: emergency contact (n=747, 94%), at least 1 health care agent (n=298, 38%), legal guardian (n=58, 7%), portal proxy (n=79, 10%), and close relative listed in patient relationship table (n=749, 95%). Among the 752 who had at least 1 named agent, when we matched caregiver term text with named agents (first and full name), more than 95% of the cohort had at least 1 mention of a named agent's full name near a caregiver term in encounter notes; 52% had a full name match in patient portal messages. Among named agents, 91% had their full name mentioned at least once in an encounter note, 89% were listed alongside a caregiver keyword, and 67% were mentioned explicitly with "caregiver" or "care partner."
Conclusion: We developed an algorithm to identify potential caregivers across the caregiving network using structured and unstructured EHR data to potentially enhance health services for PLWD and their network of caregivers.

Large Language Model for Colonoscopy Pathology Text Extraction

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Background: Adenoma detection rate (ADR) is an important quality measure for screening colonoscopy. However, tracking and reporting ADR is a resource-intensive process often requiring extraction of unstructured text. We previously reported a natural language processing (NLP) algorithm using regular expression. Herein, we compare accuracy of that model to a novel NLP method using large language model (LLM).
Methods: We developed a novel NLP algorithm using LLM to extract colon polyp information from free-text pathology reports. Data source included 109,296 colonoscopy pathology reports collected at an integrated health system serving Northern California between 2010 and 2020. We labeled each pathology report based on clinician-reported data as having adenoma vs no adenoma. We fine-tuned 4 LLM (BERT, DistlBERT, BioBERT, ClinicalBERT) using our labeled pathology reports. The accuracy, precision, recall, and F1 scores were calculated for each LLM with 3 epochs with 80%/20% training/test split. We also evaluated the impact of sample size on model performance using 3 sample sizes (10K, 50K, and full dataset.)
Results: For each sample size, we found accuracy, precision, recall, and F1 score to be similar among the 4 LLM (using the full sample as an illustration: accuracy was 0.987–0.988; precision was 0.991–0.994; recall was 0.986–0.988; and F1 was 0.989–0.990), with BioBERT had the highest accuracy, precision, and F1 score. The BERT-based LLMs achieved higher rates in all 4 performance metrics than those in the NLP

algorithm using regular expression (accuracy: 0.928, precision: 0.982, recall: 0.924, and F1: 0.952). There is increased accuracy with larger sample size (using BERT as an illustration: accuracy was 0.970 vs 0.985 vs 0.987 for 10K, 50K, and full sample, respectively; precision was 0.970 vs 0.990 vs 0.991; recall was 0.980 vs 0.983 vs 0.987; and F1 was 0.974 vs 0.987 vs 0.989).
Conclusion: The BERT-based LLM performed better than the NLP algorithm using regular expression. Performance across the 4 BERT-based models tested was comparable. Automated NLP tool using LLM can be accurate method of labeling colonoscopy reports for quality measure.

Using a Standardized Relative Resource Cost Algorithm to Estimate Health Care Costs in a Rare Disease: Application to Systemic Sclerosis

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Background: Rare diseases like systemic sclerosis (SSc) often incur increased morbidity, premature mortality, and increased health care utilization and cost, yet may go unnoticed given limited prevalence. Care is often provided at specialty centers, limiting generalizability. This study provides generalizable cost evidence derived from utilization data captured in electronic health records for community-based SSc care.
Methods: We applied the validated standardized relative resource cost algorithm (SRRCA) to the most recent 12 months of utilization data for 191 people diagnosed with SSc and ≥1 year of continuous enrollment during 2005–2019 in a mid-Atlantic integrated health system. The SRRCA applies nonproprietary, publicly available fee schedules to convert utilization data into generalizable uniform cost estimates, by total and medical care component, adjusted to 2020 dollars. Utilization and cost were described overall and by outpatient, hospital ambulatory, telehealth, inpatient, skilled nursing facility, other institutional, home health, dialysis, and ambulatory surgical center visits; pharmacy dispensing; chemotherapy administrations; and durable medical equipment, and contrasted with existing research.
Results: Mean number of total health system encounters during their most recently observed year of utilization was 30.5. Encounters included 19.8 ambulatory visits (65%), 5 telephone/video visits (16%), 1.7 email visits (6%), 1.4 dialysis visits (5%), and 1.2 hospital ambulatory visits (4%). Among 191 people with SSc, 37 (19.4%) had an institutional stay. Of those, the mean inpatient stay was 12.4 days (n=36), followed by skilled nursing facility (9.2 days, n=6), and other institutional stays (4.7 days, n=6). In 2020 dollars, overall mean annual health care costs were $32,515.86 (median cost: $11,765), comprised of dispensed medications at $17,085.82 (53%), followed by inpatient costs at $9,037.23 (28%), ambulatory visit costs at $2,968.20 (9%), hospital ambulatory costs at $1,163.71 (4%), and chemotherapy costs at $886.83 (3%).
Conclusion: The bulk of utilization occurred in the ambulatory setting, while medication and institutional care accounted for a majority of costs. Consideration of sample source, care delivery system, and costing methods are essential for optimal cost estimation, comparisons, and generalizability. Future work will use the SRRCA to contrast the cost of SSc care in community-based and specialty care settings.

GENOMICS & PRECISION MEDICINE

Construction of Genomics-Based Risk Scores for Predicting Suicide Attempts in U.S. Diverse Populations

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Background: Suicide attempts (SA) have been estimated to occur about 10–20 times more frequently than actual suicide death. Known risk factors for SA are mental health conditions, social determinants of health, and genetic diathesis. Previous SA prediction models mainly used clinical records; this study aimed to construct genomics-based risk scores that may have incremental value for future SA prediction.
Methods: This study leverages longitudinal population cohorts in the All of Us (AoU) dataset, with HCSRN sites participating in recruitment. SA cases were extracted using diagnostic codes and observations in the electronic health records and surveys. Two components were included to construct genomic risk scores: polygenic risk score (PRS) and disease family history (FH). A continuous PRS was calculated using PRS-CSx, separately for European and non-European Americans. Multiethnic genetic data for PRS weighting were accessed from the Million Veteran Program and Psychiatric Genomic Consortium. FH was collected from the All of Us survey for major psychiatric diseases. Lasso and logistic regressions were used to select and combine PRS and FH across multiple diseases.
Results: In total, 4770 SA cases and 177,140 non-SA controls were identified in All of Us. Male, younger age, non-White race, and psychiatric diseases were all significant risk factors ($P<0.001$) for SA. When checking the time of SA to last outpatient visit, 89% of cases had a clinical visit in the prior year to the SA event. For individual-disease PRS and FH, we not only found significant intraphenotype association (SA-SA odds ratio: 1.11; P=3.09-03), we also observed equivalent or even stronger association when predicting SA status with genomic risk of other MH conditions (eg, opioid use disroder-SA odds ratio: 1.13; P=6.95-04) in European Americans.

The associations in African Americans were weaker but had consistent directions of effect. When combining PRS and FH across diseases, we achieved a better discrimination power to stratify SA status.
Conclusion: Altogether, our preliminary findings from the All of Us dataset provide evidence supporting genomics-based SA prediction and highlight the importance of revising genomic risk calculation of SA through both conditional and joint analysis for mental health conditions. Additional validation for our genomic risk scores is ongoing with data from the Kaiser Permanente Research Bank.

Leveraging Genetic Information to Improve Health: The myGenetics Experience at HealthPartners

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Background: Genetics contribute to disease at varying rates, with large gaps in knowledge remaining. Health care has not effectively leveraged genetics to benefit patients. Since the first genome sequence in 1990, advances now allow genome sequencing for under $1000, facilitating the advancement of precision medicine in the community to tailor disease prevention and treatment to a patient's genetic profile.
Methods: HealthPartners is recruiting 100,000 patients to participate in myGenetics, a community-based research program. CDC Tier 1 genetic test results for *BRCA1/BRCA2*, familial hypercholesterolemia (FH), and Lynch syndrome (LS) are returned to patients and their care team. Sequence data is stored for future clinical re-use. Paired phenotypic (electronic medical record)-genotypic (whole exome-plus sequence; Helix Corp.) data are de-identified and combined with participating Helix partner institutions with nearly 1 million sequenced patients. Early use case analyses of cytochrome P450 2C19 (CYP2C19) and dihydropyrimidine dehydrogenase (DPYD) metabolizer status among our patients demonstrates capacity for genomic data annotation and analysis.
Results: MyGenetics launched in 2022 and, to date, 31,298 patients are consented, 23,359 sequenced, and 437 identified as having CDC Tier 1 variants (194 *BRCA1/BRCA2*, 153 FH, and 90 LS). The estimated impact is 24 fewer cancers, 4 fewer cerebrovascular events, and an increase of 116 quality-adjusted life-years. Clinical reuse for CYP2C19/clopidogrel will launch first quarter of 2024 (more variants to follow). To date, 5 abstracts (clinical impact rare variants, SARS-CoV-2 and antivirals, *GCK* carriers in type 2 diabetes, *PKD1/PKD2* in kidney disease) have been presented and 2 manuscripts (SARS-CoV-2 and antiviral prescribing, *GCK* carriers in type 2 diabetes) submitted for publication. Local analyses of 21,898 patients identified 3.16% intermediate and 0.03% poor DPYD metabolizers and 26.0% intermediate and 2.7% poor CYP2C19 metabolizers, by race and clopidogrel exposure.
Conclusion: myGenetics leverages genetic data to provide patient-specific disease risk that can prevent adverse health events and increase life-years. Clinical re-use of genetic sequences will reduce testing costs and turnaround time and facilitate clinical decisions at the point of care. De-identified datasets support future network research, and local analyses support programmatic growth and research.

HEALTH EQUITY

Race/Ethnicity and Pharmacy Dispensing of Sodium-Glucose Cotransporter-2 Inhibitors and Glucagon-Like Peptide-1 Receptor Agonists in Type 2 Diabetes

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Background: Treatment with sodium-glucose cotransporter-2 inhibitors (SGLT2i) or glucagon-like peptide-1 receptor agonists (GLP1-RA) reduce adverse cardiorenal outcomes in patients with type 2 diabetes (T2D). Our objective was to evaluate pharmacy dispensing of SGLT2i and GLP1-RA among patients with T2D over time and by race and ethnicity.
Methods: This was a retrospective cohort study of patients (≥18 years of age) with T2D using 2014–2022 electronic health record data from 6 care delivery systems that are part of HCSRN. Cohort entry was at earliest pharmacy dispensing of any T2D medication. We used logistic regression to evaluate the association between pharmacy dispensing of SGLT2i and GLP1-RA and race and ethnicity, adjusting for cardiovascular risk factors and clinical and demographic characteristics at baseline. We also evaluated annual trends in pharmacy dispensing using logistic regression with an interaction term between race and ethnicity and dispensing year, adjusting for age, sex, and site, to output annual predicted rates for SGLT2i and GLP1-RA by race and ethnicity.
Results: Our cohort included 681,823 patients (median age of 60 years; 46.4% female; 0.3% American Indian or Alaska Native (AI/AN), 16.6% Asian, 10.5% Black, 1.4% Hawaiian or Pacific Islander (HPI), 31% Hispanic, 3.8% Other, and 36.4% White). Patients were followed for a median of 6 years. The rate of annual pharmacy dispensing of SGLT2i increased from 0.1% to 12.2% between 2014 and 2022 and increased from 0.3% to 3.8% for GLP1-RA. In adjusted models, SGLT2i dispensing was lower for AI/AN (odds ratio: 0.80, 95% CI: 0.67–0.93), Black (0.89, 0.86–0.92) and Hispanic (0.87, 0.85–0.89) compared to White adults. GLP1-RA dispensing was lower for AI/AN (odds ratio: 0.79, 95% CI: 0.63–0.97), Asian (0.50, 0.48–0.52), Black (0.86, 0.83–0.90), HPI (0.51, 0.46–0.57), Hispanic (0.69, 0.66–0.71), and Other (0.78, 0.73–0.83) compared to White adults.
Conclusion: Pharmacy dispensing of SGLT2i and GLP1-RA medications was lower in patients with T2D from minority groups compared to White adults in 6 large care delivery systems that are part of HCSRN. This suggests the need for equitable interventions to narrow the race and ethnicity gap in the use of these drugs to reduce adverse cardiorenal outcomes in the United States.

Disparities in Telemedicine Access: Patient Comorbidities and Language Preference

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Background: Disparities in telemedicine adoption have been observed, particularly among patients with non-English language preference (NELP); however, patients with greater medical complexity are more likely to access telemedicine. We aimed to examine how the relationship between language preference and telemedicine use differed by Charlson Comorbidity Index (CCI).
Methods: This is a retrospective study of adult primary care visits from 2021 to 2022 in a large Midwestern health system. We randomly selected 1 visit per patient per year for inclusion. Visits were in-person or telemedicine (telephone or video). We identified NELP patients by interpreter flag in the electronic medical record, recent use of an interpreter, or a non-English preferred language. We grouped CCI as minimal (0), mild (1–2), moderate (3–4), or severe (≥5). We used log-binomial generalized estimating equations clustered by patient to estimate risk ratios (RR) for telemedicine use, assessing the interaction between ELP and CCI. Models were adjusted for sex, age, race, ethnicity, insurance, state, year, and neighborhood traits (income, educational attainment).
Results: During the study period, 1,252,336 patients had primary care visits, of whom 61% had visits in both 2021 and 2022, for an analytic sample of 2,021,940 visits. Patients needing interpreters accounted for 3.1% of visits (n=40,173 patients). We observed a statistically significant interaction between CCI and interpreter need for the likelihood of telemedicine use. Among all patients, the likelihood of telemedicine use increased with CCI. Compared to ELP patients, NELP patients were less likely to have telemedicine visits with lower CCI, with RR of 0.70 (95% CI: 0.66, 0.75) for minimal and 0.77 (95% CI: 0.71, 0.85) for mild CCI. At moderate CCI (RR: 0.97; 95% CI: 0.84, 1.12) and severe CCI (RR: 1.13; 95% CI: 0.97, 1.30), NELP patients had similar likelihood of telemedicine use as ELP patients.
Conclusion: While NELP patients are less likely to use telemedicine at lower medical complexity, their use of telemedicine increases to the level of ELP patients at greater medical complexity. This may reflect barriers that NELP patients face in accessing telemedicine and interpreting services in their preferred language.

How Oncology Practices Consider Equity When Sustaining Virtual Visit Programs: A Qualitative Study

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Background: During the COVID-19 pandemic, many oncology practices implemented virtual visits. How these practices considered equity in virtual visits postpandemic given a context of heightened awareness of structural barriers and disparities remains unknown. Using qualitative research methods, we examined how U.S.-based oncology practices considered equity in their virtual visit programs.
Methods: We conducted semi-structured, in-depth interviews with key informants from a national sample of community and academic oncology practices, recruiting 1 to 3 individuals per practice. A research assistant with a background in health planning conducted interviews between October 2021 and January 2023. Interviews were transcribed verbatim and organized topically in Atlas.ti. In this study, we focus on the "diversity, equity, or inclusion (DEI)" and "care quality" reports. Seven research team members with varied backgrounds, including 2 patient and family advisory board members, reviewed reports independently before collaborating to identify themes using a series of iterative and interpretive immersion/crystallization cycles.
Results: A total of 39 individuals from 16 academic and community oncology practices were interviewed. Interviewees primarily reported being middle managers and included administrators and clinicians. Three overarching themes emerged: 1) Practices used reactionary approaches to implementing processes to identify and mitigate health care inequities (eg, activities aligned with only external requirements/incentives and did not include routine monitoring activities); 2) Respondents perceived minimal personal responsibility for equity (eg, DEI described as the responsibility of others and disconnected from their daily activities); and 3) Respondents exhibited a lack of understanding of the concept and breadth of health care equity (eg, addressed only racial equity and conflated equity with equality).
Conclusion: Equity considerations were not prioritized in the delivery of oncology virtual visits. Overall, respondents described organizations in the early stages of DEI maturity (ie, developing awareness and compliance with only external requirements). Findings underscore the need for concrete implementation strategies that integrate DEI efforts throughout an organization, including virtual visits.

Project HOME: Evaluation of a Progressive Engagement Model Addressing Homelessness

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Background: In response to the escalating issue of homelessness, the Kaiser Permanente (KP) National Office of Community Health launched Project HOME, an initiative addressing the housing needs of unhoused KP members and non-members using KP facilities. Project HOME is founded on a progressive engagement model driven by strategic partnerships with community housing partner organizations in 3 KP regions.
Methods: We analyzed community housing partner data and participant surveys to assess the impact on housing stability,

health care access, and health care utilization within this vulnerable population. Our analytical approach involved examining monthly housing reports from community partners and evaluating participant survey responses. Community partner data for 93 participants was analyzed for changes in housing status from enrollment to the most recent monthly time point available, on average, 8.1 months. Survey data for 35 participants who completed surveys at baseline and an average of 7.6 months postenrollment were analyzed using McNemar's test to provide an understanding of changes over time.

Results: Among 93 participants reported on in the community partner data, 48 (52%) secured housing, with 35 (38%) moving into permanent housing and 13 (14%) moving into temporary housing. Participant surveys also reflected improved housing status, with a 35% reduction in participants reporting needing a safe place to live (79% at baseline compared to 44% at follow-up; P=0.005). Furthermore, there was a significant increase in participants reporting adequate access to health care as a need (66% at baseline to 89% at follow-up; P=0.005). Finally, the proportion of survey respondents reporting emergency department utilization in the prior 3 months reduced from 77% at baseline to 40% at follow-up (P=0.0008).

Conclusion: Project HOME's multifaceted strategy demonstrated positive outcomes, fostering increased housing stability and access to health care and substantial reductions in reported health care utilization. These findings underscore the program's effectiveness in addressing the intricate interplay of housing and health challenges among vulnerable populations, reinforcing its potential as a model for holistic

An Innovative Measure of Health Equity in Guideline-Directed Medical Therapy Use Among Patients Who Have Heart Failure With Reduced Ejection Fraction

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Background: Guideline-directed medical therapy (GDMT) significantly reduces morbidity and mortality for heart failure with reduced ejection fraction (HFrEF). Huge disparity exists in GDMT uptake among socioeconomic levels, however, few studies quantify the disparity. We derived a health equity index (HEI) for GDMT uptake to give administrators or population health managers an assessment tool.

Methods: HEI for GDMT is estimated by the ratio of observed-to-expected values. HEI of >1.0 represents a health inequity. The number of expected patients with GDMT gap was derived from a weighted average of subpopulation distribution of the GDMT gap for each race/ethnicity and median household income (MHI) — <2 or ≥2 times the federal poverty level — by catchment area. We defined GMDT gap as patients with <3 GDMT classes prescribed in previous 12 months or having a weighted GDMT score (WGS) of <5, with sodium-glucose cotransporter-2, angiotensin receptor-neprilysin inhibitor, and beta blockers assigned a weight of 2 and angiotensin-converting enzyme inhibitor/angiotensin receptor blockers assigned weight of 1. We applied these two approaches and estimated HEI for the entire HFrEF population and subgeographic areas where race/ethnicity and MHI vary significantly.

Results: HEI was estimated on the latest encounter with HFrEF diagnosis in the electronic health records between 2020 and 2022. Among 10,851 patients with HFrEF, 88% had GDMT gap if using <3 GDMT class, varying from 85% to 96% in 6 geographic areas, and 68.5% had GDMT gap if using WGS, varying from 60% to 85% geographically. The HEI for the whole HFrEF population was 1.02 using order data and GMDT class count criterion, varying from 1.02 to 1.09 in the geographic areas, and was 1.09 for overall population, varying from 1.04 to 1.24 using WGS. Using the WGS approach, the geographic area with the highest HEI score (1.24) serves the highest proportion of non-Hispanic Black patients, and the area with the lowest HEI (1.04) appeared in the area serving a more Asian population (13.7% vs 9% in the whole population)

Conclusion: HEI for GDMT shows disparities in medication treatment for the HFrEF population. HEI is more sensitive to WGS as compared to simple GDMT class count. Disparities were observed in different geographic areas, implying feasibility of using HEI to indicate disparities in GDMT use, and can be used to prioritize populations through equitable care strategies.

Reaching Underserved Patients Referred for Lung Cancer Screening: Healthy Lungs Trial at Kaiser Permanente Southern California

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Background: Healthy Lungs is a clinical trial comparing 4 interventions to promote smoking cessation for 6 months among underserved people referred for lung cancer screening at 4 U.S. health systems. Kaiser Permanente Southern California (KPSC) implemented the protocol pragmatically at 23 imaging centers. Smoking-related illnesses, like lung cancer, are especially prevalent among underserved patients.

Methods: KPSC outpatient radiology clinics with highest volume of annual lung cancer screening (LCS) low-dose computed tomography (LDCT) scans were invited to participate (n=25). Technologists are trained by Healthy Lungs staff to offer study iPads to LCS patients, who then created accounts on the secure Way2Health portal. Participants confirmed their eligibility based on self-identified sociodemographic characteristics and smoking status. Patients also received email and text invitations at the time of their LCS referral and CT scan. Participants are randomized to 1 of 3 arms. The arms include 1) "ask–advise–refer" care and smoking cessation aids at no added cost, 2) added financial incentives, and 3) added an episodic future thinking tool.

Results: Study procedures were successfully integrated into existing workflows in alignment with PRECIS-2 criteria at

23 of 25 KPSC radiology clinics. Email and text invitation recruitment began November 15, 2021. The iPad clinic launches were staggered between November 21, 2021, and August 3, 2023. Some clinics had challenges with the iPad, so an alternative business card recruitment method was offered with study information for participants to access the Way2Health portal at home (n=5). Two clinics were unresponsive. Since the respective clinic launch dates, there have been 9092 LDCT scans for LCS referrals and 3341 patient accounts created in Way2Health to determine Healthy Lungs eligibility. As of November 1, 704 underserved participants were enrolled at KPSC.
Conclusion: Embedding smoking cessation interventions within LCS programs is particularly beneficial for underserved patients. Our team tailored workflows to each site depending on their capacities. Monthly check-ins and yearly refreshers were provided. The results of this trial will help health systems choose smoking cessation interventions to promote smoking cessation and reduce health care inequities.

Deliberate Planning and Facilitation to Achieve Dialogue and Impact in a Community Advisory Council for Research and Evaluation

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Background: Recognizing that community engagement and inclusivity are crucial for research and quality improvement (QI) to address health disparities, the HealthPartners Institute formed a Community Advisory Council. Creating respectful culture and safe space for a diversity of perspectives on the council has required careful facilitation and planning by the council's co-chairs and operations team.
Methods: Development of the council has been guided by the principles of broad representation, dialogue, reciprocity, and impact. The council's charter, member recruitment, and operations have drawn from the Technology of Participation. Following best practices from similar efforts elsewhere, the council has both a health systems chair and a community chair who is part of all internal planning processes around meetings and follow-up. Council meetings have been guided and very deliberately structured by the operations team. Facilitation by council co-chairs has used methodologies from Focused Conversation, the Art of Hosting, and the Art of Participatory Leadership.
Results: A collaborative tone, unhurried pacing, and consensus-based meeting agreements have fostered an inclusive and respectful meeting environment where community members feel encouraged to voice concerns and contribute the fullness of their perspectives. Maintaining that environment has required additional work and adaptation to ensure that the presenters and presentations of health care research and QI are aware of and aligned with the culture of the council. Responses from council members, researchers, and health plan presenters suggest that the council environment also fosters receptivity and responsiveness from the health system, producing feedback that can be incorporated into research and QI to create lasting change with the goal of improving health disparities and equity through our health system.
Conclusion: The council has become an important partner in multiple stages of our research development and quality efforts. Careful facilitation has allowed the council to highlight overlooked perspectives and health care concerns. The council's feedback and its developing culture have influenced not only research and quality but also the manner of our organization's engagement with the communities we serve.

Health Trends Across Communities in Minnesota: A Statewide Collaboration to Improve Public Health Using Electronic Health Record Data

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Background: Health Trends Across Communities in Minnesota (HTAC) is a unique data collaboration of health systems, local public health departments, and health plans. It uses detailed summary electronic health record (EHR) data to support statewide and community health monitoring, promote health equity, and improve the health of communities across Minnesota. Data are summarized in a public-facing dashboard.
Methods: The Minnesota EHR Consortium uses a distributed data model to coordinate data management, analysis, and reporting by 11 large health systems that provide statewide care to ~90% of Minnesotans. In collaboration with public health partners, 25 key community health indicators in 5 categories were prioritized for inclusion: substance use (eg, opioid use), mental health (eg, depression), chronic conditions (eg, type 2 diabetes, hypertension, asthma), maternal health (severe maternal morbidity), and other (gun violence, climate change). For each indicator, diagnosis code sets were created and mapped to the OMOP common data model, de-duplication and extraction code was distributed to sites, and summary site data were aggregated for dashboard display.
Results: Each health indicator can be stratified by age, sex, race, ethnicity, and special populations (incarceration, homelessness, Medicaid status) and mapped at the census tract level. As of this writing, the population (N=5,794,244), including 19% children and 81% adults, is 74% non-Hispanic White (62% in children) and 53% female (49% in children). Prevalence of some statewide indicators among adults is opioid use 1.1%, depression 13.9%, type 2 diabetes 7.6%, hypertension 20.7%, and asthma 5.8%. Among children, 0.1% have type 2 diabetes and 5.3% have asthma. Opioid use, diabetes, hypertension, and depression are far more prevalent in adults of all race/ethnicities, age groups, and in both sexes covered by Medicaid than in those with other insurance (eg, opioid use in Native Americans 10% vs 5%, depression in women 26% vs 16%, diabetes in age 45–64 15% vs 7%).
Conclusion: HTAC is the first comprehensive, open, privacy-

preserving statewide resource to use EHR data for tracking a wide variety of health indicators and health disparities at the census tract level. It lays the groundwork for Minnesota to monitor community and state health needs and outcomes over time, target resources, develop and evaluate policies, and manage future public health crises.

HEALTH POLICY

Money, Medicines, and Medicaid: Pharmaceutical Company Payment Anomalies on Preferred Drug List Selection Committees

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Background: Access to medications for Medicaid patients relies on their drug being added to the state's preferred drug list (PDL). Medicaid PDL selection committee members decide drug inclusion. Conflicts of interest (COI) may impart implicit or explicit bias on member decisions. We aimed to explore potential COI by analyzing payments received from state PDL members from drug and medical device companies.
Methods: Medicaid PDL selection committee members active between 2019 and 2022 from 50 states and Washington, DC, were eligible for inclusion. Members were obtained via state webpages. The Wayback machine (web.archive.org) was used to collect information unavailable at the time. Public record requests were used for other missing information. Member details were collected using the National Plan and Provider Enumeration System. CMS OpenPayments (openpaymentsdata.cms.gov) was used to characterize payments to eligible members, called "covered recipients." Payments were expressed as total dollar, non-research dollar, and non-food + non-research dollar. We detailed member anomalies as those receiving non-research payments double their specialty's average.
Results: Preliminary results, completed alphabetically, for 33 states and DC were obtained. Of these, 28 state's membership were retrieved for each calendar year. Three states were excluded due to no PDL and 2 states await public record requests. Nearly 50% (195 of 391) of members were eligible covered recipients. Among covered recipients, 60% (117 of 195) accepted payments and 26.2% (51 of 195) accepted non-research and non-food payments. Members received almost $7.5 million and $783,221.55 in non-research payments. The top 20 members received over $7.4 million in total (98.9%) and $734,148.67 in non-research payments (93.7%). Five member anomalies were identified. Anomalies earned $539,424.45 (68.9%) of non-research payments. The highest earning member anomaly earned $280,192.28 (35.8%) in non-research payments and $160,271.55 in 2019 alone.
Conclusion: Payments from industry to Medicaid PDL committee members is common. Large variations in the amount and types of payments exist, with select few receiving well above average trends. These preliminary results raise questions over the influence of industry on Medicaid PDL selection committees. Further research will complete all 50 states and will investigate if payments influence member actions.

IMPLEMENTATION & HEALTH CARE DELIVERY SCIENCE

Implementation of a Telephonic, Pharmacist-Led, Metformin Dose Optimization Program With a Health Insurance Marketplace Exchange Plan

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Background: Metformin is highly efficacious in the treatment of type 2 diabetes but requires dose titration for maximum efficacy. A pharmacist-led metformin dose optimization program was established within a health system to enhance between-visit care and improve diabetes control. This study evaluated the effectiveness of the metformin program for patients insured by a health insurance marketplace plan.
Methods: Patients with type 2 diabetes (hemoglobin A1c of 7%–10%) who were prescribed suboptimal metformin doses (≤1500 mg/day) were included. Exclusion criteria included being prescribed additional diabetes medication(s) and safety concerns such as renal impairment. Program referrals were sent to primary care providers through the electronic health record for co-signature. Pharmacists performed telephonic outreach to enroll patients, with follow-up every 2 to 4 weeks during the 12-week program. Outreach included metformin titration, patient monitoring, education, and adherence support.
Results: A total of 405 patients were identified as potential program candidates. After chart review, referrals were sent to providers for 121 eligible patients and 86% of referrals were signed. After initial pharmacist outreach, 37 patients (31%) were enrolled; 70% of enrolled patients successfully completed the program. Engagement rates were lower than previously seen in a Medicare population. The average increase in total daily metformin dose after 12 weeks was 964 mg, with 81% of patients taking the target dose of 2000 mg. Average hemoglobin A1c improvement was -0.6% (from 7.6% to 7%). After a mean follow-up of 1.3 years, 73% had not needed another diabetes medication and 65% had a hemoglobin A1c less than 7%. Pharmacy costs for those successfully completing the program decreased by 22% from pre- to postprogram.
Conclusion: The pharmacist-led, telephonic, metformin dose optimization program was effective in enhancing coordinated team-based care, which led to sustained improvements in diabetes control, delayed need for additional diabetes medications, and decreased medication costs. For the working-age population, alternative outreach methods may enhance engagement.

Evaluation of the No Sleepless Nights Program for Reducing Time From Radiological Finding of Adrenal Adenoma to Diagnostic Testing

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Background: For patients with abnormal radiological findings, timeliness of care is imperative. Kaiser Permanente Georgia's (KPGA) No Sleepless Nights (NSN) program created an automated and streamlined workplan after discovery of abnormal radiological findings, such as adrenal adenomas. Our aim was to determine if the NSN adrenal adenoma program improved diagnostic test completion and timeliness compared to previous years.
Methods: KPGA adults (≥18 years of age) with their first adrenal adenoma between 2015 and 2022 were identified using ICD codes and the problem list. Based on international guidelines, dexamethasone suppression test (DST) is the recommended diagnostic test for adrenal adenoma and was our primary outcome. Medical records were used to determine first DST order date and first DST completion date after adenoma identification. Time to first DST completion within 365 days was calculated for members identified pre- and post-NSN implementation in 2022. Descriptive statistics and Kaplan-Meier curves estimated time to first DST completion within 365 days of adrenal adenoma report.
Results: We identified 2464 members with adrenal adenomas during 2015–2022. Among participants with adrenal adenomas, 289 (11.7%) had record of a DST order. DST order rate increased from 9% in 2015–2021 to 22% in 2022 (P≤0.001). DST completion rates increased from 6% in 2015–2021 to 17% in 2022 (P≤0.001). Median days from adenoma to DST completion decreased to 16 days (interquartile range [IQR]: 3, 42) in 2022 from 23 days (IQR: 8, 84) in 2015–2021. Kaplan-Meier curves reported members with an adrenal adenoma in 2022 were more likely to complete a DST within 365 days vs those diagnosed in 2015–2021 (P<0.001), with the greatest differences seen within 100 days after diagnosis.
Conclusion: KPGA's automated and streamlined NSN program increased the percentage of DST orders and significantly decreased time from adrenal adenoma to DST completion. Automated workflows can improve timeliness to care and improve the health system's ability to meet medical guidelines; health systems are encouraged to adopt a similar approach to NSN to improve their patients' access to care.

Four Emergent Types of Care Coordination in Primary Care Clinics: Findings From a Latent Class Analysis

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Background: There is large variability in how care coordination is implemented in primary care, with limited standardization a barrier to studying its effectiveness. Latent class analysis (LCA) is a data-driven way to identify clusters or types of care coordination and what factors define these types. Herein, LCA was used to identify distinct types of care coordination in a large sample of primary care clinics.
Methods: Care coordinators in 317 primary care clinics participating in the observational Minnesota Care Coordination Effectiveness Study (MNCARES) were invited to complete a survey about care coordination implementation at their clinics. Survey items asked about care coordination referrals, services, communication, logistics, panel size, and clinic support. A total of 42 survey items were used in an LCA model to identify distinct types of care coordination approaches. Model fit and descriptive statistics were used to select the number of types present and describe their defining characteristics. Bivariate tests were used to identify association of care coordination types with other clinic, health system, or community characteristics.
Results: Care coordinators (N=215) representing all 317 clinics provided survey responses for these analyses. LCA fit statistics and class distribution suggested 4 types of care coordination exist in these data. The 4 types were distinguished by the services provided, presence of a social worker on the care coordination team, panel size, and perceived clinic support for care coordination. The largest type (N=152 clinics, 48%) was characterized by structural factors like being likely to offer many medical and social services and process factors like consistent interaction with care teams and perceiving colleagues as valuing their role. Other types were defined by different combinations of these components. Care coordination type was related to clinic geography and community resource availability but not patient financial constraints.
Conclusion: Distinct types of care coordination in primary care are defined by both structure and process and are associated with clinic and community characteristics. These results lay the groundwork for empirically describing care coordination implemented and understanding which approaches to care coordination are most effective. Relationships with patient outcomes will be discussed as available.

Progression From Prediabetes to Diabetes in Patients With Severe Obesity

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Background: Prevalence of prediabetes and of severe obesity (body mass index [BMI] of ≥40 kg/m^2) are increasing worldwide. Preventive interventions resulting in 5%–7% weight loss are advised to treat prediabetes, but little is known about

the effectiveness for persons with severe obesity. This study evaluates the relationship between weight loss and progression from prediabetes to diabetes in persons with severe obesity.
Methods: The Geisinger electronic health record was used to retrospectively identify patients with severe obesity and prediabetes (hemoglobin A1c of 5.7%–6.4%). These patients were categorized based on weight change in the year following the qualifying hemoglobin A1c, including weight stable (1-year weight within 3% of baseline weight), small weight loss (3%–7%), moderate weight loss (7%–15%), large weight loss (>15%), or use of bariatric surgery (mean 12-month weight loss of 30%). Patients with >3% weight gain or any evidence of prior diabetes diagnoses or treatment were excluded. Progression to diabetes was estimated using Kaplan-Meier analysis. Time until progression to diabetes was compared between weight change groups using Cox regression and adjusting for baseline hemoglobin A1c, BMI, age, and sex.
Results: The 7789 patients with prediabetes included 68% female, mean age of 48 years, BMI of 47, and median follow-up of 3.9 years. The cohort included 54% weight stable; 19% small, 11% moderate, and 3% large weight loss; and 14% bariatric surgery. Progression to diabetes at 5 years was highest in the weight stable group, followed by small, moderate, and large weight loss, and then bariatric surgery (40%, 33%, 32%, 13%, and 2%, respectively; P<0.001). As compared to the weight stable group, time until progression to diabetes was longer in the bariatric group (hazard ratio [HR]: 30.3, 95% CI: 20.8–43.4) and in those with large weight loss (HR: 5.0, 95% CI: 3.4–7.4). Time to progression was longer in the small and moderate weight loss groups but the effect was weaker (HR: 1.3, 95% CI: 1.2–1.5 for small; HR: 1.5, 95% CI: 1.3–1.7 for moderate).
Conclusion: Large amounts of weight loss (>15%) may be needed to have a clinical impact on delaying the progression to diabetes in persons with severe obesity. Independent of or adjunctive to effective preventive interventions, treatments that result in large weight loss (eg, bariatric surgery, glucagon-like peptide-1 agonist) could be encouraged for persons with severe obesity.

Results From a Hybrid Effectiveness-Implementation Trial to Improve Uptake of a Secure Firearm Storage Program in Pediatric Primary Care

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Background: Despite evidence-based recommendations for pediatric primary care clinicians to counsel caregivers on secure firearm storage to prevent youth suicide, this practice is not routinely done. The ASPIRE randomized controlled trial (R01 MH123491), conducted at 30 clinics across Kaiser Permanente Colorado and Henry Ford Health, aims to address this problem by leveraging implementation science and behavioral economics.
Methods: All well-visits for youth 5–17 years of age were eligible to receive a universal suicide prevention program, S.A.F.E. Firearm, which includes 1) a brief discussion on secure firearm storage with youth/caregivers and 2) offering a free cable lock. A cluster randomized hybrid effectiveness-implementation type III trial compared two implementation strategies: "Nudge" — an electonic health record (EHR) reminder, parent hand-outs, and clinician training — vs "Nudge+" — in which practice facilitation was added. Practice facilitation involved a trained facilitator checking in with clinics, troubleshooting implementation barriers, and providing audit and feedback reports. The primary outcome was clinician-reported delivery, and secondary outcome was parent-reported receipt of the program over 1 year.
Results: Youth/caregivers presenting to clinics receiving the Nudge + facilitation were 2.12 times more likely to receive the entire program than those presenting to clinics receiving Nudge only (53% vs 25% probability at Nudge+ vs Nudge clinics; N=44,468 visits). Facilitation was efficiently delivered as facilitators spent ~10 hours per clinic over the year. Clinicians documented firearm storage counseling and offering locks at 57.5% and 40.2% of eligible visits, respectively. Caregiver report corroborated clinician documentation (48.3% and 31.2% of caregivers reported receiving firearm storage counseling and being offered a lock, respectively; 40% response rate). Prior to S.A.F.E. Firearm, clinicians reported that 3% of visits included a firearm safety conversation and offer of a lock, representing robust practice change.
Conclusion: This study illustrates that EHR reminders and facilitation are effective strategies to increase uptake of interventions in health systems. S.A.F.E. Firearm was delivered at nearly 25,000 well-child visits across two geographically, demographically, and culturally diverse health systems in just 1 year, suggesting promise for broad nationwide reach of this program in pediatric primary care.

Implementing Clinician-Led Peer Training Sessions in a Large Ambulatory Medical Group for Continuing Professional Development and Improvement of Patient-Reported Experience

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Background: Understanding and continual improvement of patient experience is critical to a health care organization's long-term success. Many health systems use patient-reported experience measures (PREMs) to assist with quality improvement. The Palo Alto Medical Foundation (PAMF) developed a type of continuing professional development (CPD) program to improve communication called "Clinician

PAMFCARES."

Methods: Clinician PAMFCARES sessions are annual, mandatory, 90-minute sessions held on Zoom, with 8–12 clinician participants, on average, and led by 2 clinician facilitators for peer-to-peer teaching and role play practice in a safe space. We conducted a retrospective evaluation of Clinician PAMFCARES to determine if annual physician training improved overall patient experience scores. We looked at PREMs for how well their physician "explains," "listens" to them, "overall provider rating," and if they would "recommend" the practice and then computed the yearly patient experience scores (indicating the percentage responding to top-box) between 2018 and 2022. We used Cochran-Armitage and chi-squared tests to assess trends and associations.

Results: A total of 3274 physicians participated in Clinician PAMFCARES trainings from 2018 to 2022; most were female (51.41%), White (53.76%), and 40–59 years of age (47.26%). All 4 PREM areas — "explains," listens," "overall rating," and "recommend" — increased from 2018 to 2022 (P<0.0001); of note, the newest version of Clinician PAMFCARES was launched in 2019. Trends plateaued during 2020–2022 for "recommend" (86.8%, 86.2%, and 86.3%, respectively) and during 2021–2022 for both "explains" (90.1% and 89.8%, respectively) and "listens" (91.5% and 91.2%, respectively). About 30% of clinicians completed experience surveys provided after the course in 2021 and 2022. Those who reported "very satisfied" increased from 2021 to 2022 for the facilitator (89% to 91%), session content (70% to 76%), and ease of using the virtual format (83% to 88%).

Conclusion: Our findings suggest that Clinician PAMFCARES can be an effective intervention that can improve PREMs in a large health system, as shown by the increase in our patient experience scores. The plateau suggests there may be limits to how much a CPD intervention can improve the overall patient experience, as there are numerous factors that contribute to overall patient experience.

Acupuncture in the Emergency Department: Patient Acceptability and Pain Reduction

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Background: Patients with pain account for more than 70% of emergency department (ED) visits, and acupuncture is a nonpharmacological option that has shown promising results in pain management. We aimed to assess the acceptability of acupuncture offered in 3 emergency departments in a large Midwestern health system at no out-of-pocket cost to patients.

Methods: Patients presenting to a participating ED between April 17, 2023, and August 31, 2023, were eligible to receive acupuncture if they presented with a non-life-threatening issue, did not have a contraindication to acupuncture, and could consent to treatment. Surveys, offered in English and Spanish, asked patients to report on satisfaction. We assessed frequencies and percentages for categorical variables and means and standard deviations for continuous variables. We abstracted serial pain scores (1–10, 10 being the worst) from electronic medical records, and used 2-sided *t*-tests to assess differences between first and last scores. We used linear regression to assess relationships between pain score and survey responses.

Results: Acupuncture was offered to patients at 813 ED encounters, 520 treatments were provided, and 332 patients completed surveys (87% English, 13% Spanish). Among respondents, 89% reported it was their first time receiving acupuncture. Most (97%) reported willingness to receive acupuncture again in the ED, and 63% said they would pay out-of-pocket for this treatment. On a scale of 1 (lowest) to 10 (highest), the mean satisfaction was 9.2 (standard deviation: 1.4). Medical record abstraction is ongoing and has been completed on 135 patients. Among patients with at least 2 documented pain scores (n=99), pain scores reduced by an average 3.4 points during admission (standard deviation: 0.34; P<0.005). Change in pain score was not associated with patient satisfaction or willingness to pay out-of-pocket or receive acupuncture again.

Conclusion: Patient satisfaction was high, and most patients would desire acupuncture again in the ED. Pain scores dropped during admission, and this was not associated with satisfaction with acupuncture treatment. Medical record abstraction is ongoing, and presented results will include comparisons to patients who did not receive acupuncture in the ED.

Patient Reported Outcome Thresholds for Unscheduled Health Services in Patients With Cancer

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Background: Patient-reported outcomes (PROs) monitoring may improve symptom control, unplanned health care utilization, and overall survival. However, PRO thresholds when scores should be acted on by clinicians are lacking. This study aims to establish thresholds in PROMIS scores anchored in subsequent visits to the emergency department (ED)/urgent care by patients with cancer.

Methods: This analysis was based on retrospective data from 952 patients seen and insured through the system's health insurance. Patients completed 2085 PRO assessments (up to 18 repeated measures per patient). Data on ED/urgent care visits were obtained from Health Alliance Plan of Michigan (HAP) claims. Optimal cut-points in PROMIS scores were obtained using generalized linear mixed-effects models relating the log-odds of ED/urgent care use during 14 or 30 days following each PRO assessment, while adjusting for comorbidity, sociodemographic, and tumor characteristics.

Results: The rate of ED/urgent care visits was 4% (82 of 2085) within 14 days and 7% (160 of 2085) within 30 days of completion of PRO assessments. Pain interference and physical function were significant predictors of subsequent ED/urgent care visits, but fatigue and depression were not. Optimal threshold as anchored in the likelihood of these visits differed according to cancer stage. At both the 14-day and 30-day time points, a pain interference score of 60 or higher and physical function score of 40 or lower (worse) produced best predictions in stage IV patients; optimal cut-points were 65 for pain interference and 35 for physical function for stages I–III patients.
Conclusion: Anchor-based thresholds for physical function and pain interference corresponding to 1 standard deviation worse than the general population for those with stage IV cancer and 1.5 standard deviation for those with stages I–III can inform referrals to supportive care services and may prevent ED/urgent care visits. The efficacy of these algorithms will need to be evaluated in prospective trials.

Case-Control Study of Changes in Patient-Reported Outcome Measures in Patients With Cancer 6 Months Prior to Death

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Background: There is limited understanding of the indicators when a patient with cancer is entering their terminal phase of life. Patient-reported outcome measures (PROMs) have been demonstrated to be more predictive of overall survival than traditional performance scores. This study aims to compare PROM scores in the 6 months prior to death to those in patients not experiencing death, and, secondarily, to u
Methods: In this retrospective case-control study, adult patients with cancer who died within 6 months of PROMs response (cases) were compared to controls who were alive at the time of the case's death. Cases were matched 1:3 to controls by age at PROMs completion, gender, cancer disease site, and stage. Generalized estimating equation (GEE) models adjusted for pertinent patient and clinical covariates were used to compare mean scores between cases and controls. Stratified analysis was completed by self-reported race for the two largest racial groups (Black vs White).
Results: A total of 461 cases were matched to 1270 controls. Adjusted GEE models demonstrated mean change in scores, with increased reported symptoms in cases compared to controls in all domains: fatigue (4.83 points, 95% CI: 2.94 to 6.72), pain interference (4.33 points, 95% CI: 2.53 to 6.12), depression (3.77 points, 95% CI: 2.20 to 5.34), and physical function (-6.52 points, 95%: -8.25 to -4.80). When stratified by race, similar differences in mean change in scores existed for all 4 PROMIS domains. While patients identifying as Black race had larger absolute changes in scores, these were not statistically different from patients identifying as White race.
Conclusion: On average, patients report worse PROM scores in the 6 months prior to death compared to matched controls in fatigue, pain interference, depression, and physical function domains. These differences persisted after stratification by race.

Virtual Only vs In-Home Hybrid Postdischarge Care Delivery: A COVID-19 Natural Experiment

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Background: Hospital readmission is associated with increased mortality, morbidity, and cost. Kaiser Permanente Georgia (KPGA) enrolls members at high risk of 30-day readmission (30DR) in a transitional care management (TCM) program that includs in-home and virtual visits. In March 2020, COVID-19 necessitated an abrupt change to an all-virtual format. We compared the different models in preventing 30DR.
Methods: High-risk hospital discharges (KPGA 30DR Prediction Score of >9) enrolled in TCM between January 2019 and July 2022 were included in the study population. The population was separated into a "Pre-COVID" (PRE) cohort (discharges prior to March 2020; n=404) who received a mix of in-home and phone visits and a matched "Post-COVID" (POST) cohort (April 2020 to July 2022; n=404) of members who received all remote video and phone visits. We used case-control matching methodology to ensure the two groups were comparable populations, with matching criteria of 30DRP risk score, gender, age, and authorization diagnosis.
Results: Rates of hospital readmission were low in both groups, with no significant difference found (9.9% PRE, 8.7% POST; P=0.63). Emergency department (13.1% PRE, 11.1% POST; P=0.45), 24-hour observation (3.7% PRE, 2.5% POST; P=0.42) and urgent care (1.0% PRE, 0.7% POST; P=1) similarly showed no significant difference. Members in the POST group received fewer total visits of any type (4.2 vs 5.1) and fewer completed calls (3.6 vs 3.9) compared to the PRE group. The number of medications reviews per member was not significantly different between groups (P=0.76)
Conclusion: The sudden onset of the COVID-19 pandemic allowed for a natural experiment comparing mixed vs virtual-only TCM delivery models. Our data suggest no significant difference in readmission or emergency department/urgent care utilization between models and provide support for virtual models of care that can offer increased efficiency, reduced program costs, and faster outreach to patients after hospitalization.

An Exploration of Patient-Centered Medical Home (PCMH)-Likeness and Access to Preventive Care: Communication May Be Key

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Background: The patient-centered medical home (PCMH) is a model of primary care delivery that aims to provide comprehensive, accessible, and high-quality care. A binary indicator of PCMH status has been used to assess outcomes. However, given the mixed outcomes related to the PCMH's effect on access to preventive care, the development of a scale of PCMH-likeness is critical.
Methods: To develop a scale of PCMH-likeness, we conducted an exploratory factor analysis using data from the 2015 and 2016 Medical Expenditure Panel Survey's (MEPS) Medical Organization Survey (MOS) and access to care variables from the Household Component (HC) to determine the latent constructs, based on National Committee for Quality Assurance standards and guidelines, that are associated with PCMH-likeness. The latent constructs identified through the factor analysis represent components of the PCMH. We then used logistic regression to assess whether the components were associated with receipt of flu shot, pap smear, mammogram, blood pressure screening, and colorectal cancer screening. All analyses were conducted using Stata 16 SE and controlled for analytical survey weights.
Results: We identified 4 latent constructs that represent core components of a PCMH: access (multispecialty group, >1 location, and onsite x-ray), contact (after-hours contact and phone contact during office hours), communication (respect for treatment options and help deciding on treatments), and electronic health record (EHR screening reminders and secure messaging). There were no statistically significant components related to receiving an annual flu shot, a pap smear every 3 years, or a mammogram every 2 years. Communication was associated with increased odds of an annual blood pressure screening (odds ratio: 2.36; P=0.016) and being up to date with colorectal cancer screening (odds ratio: 1.32; P=0.045). An enhanced EHR also was associated with colorectal cancer screening (odds ratio: 1.26; P=0.018).
Conclusion: This set of 3 latent constructs allows us to measure PCMH-likeness, including for practices that are not (yet) certified. Our results suggest that patients receiving care from primary care practices that have implemented enhanced communication strategies as a part of their PCMH transformation may be more likely to receive certain preventive services.

INFECTIOUS DISEASE

Differential CoV-2 Spike IgG-Specific Responses to COVID-19 mRNA Vaccines and Breakthrough Infection

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Background: Little is known about the comparative IgG immune response trajectories between the two COVID mRNA vaccines, BNT162b2 (Pfizer) and mRNA-1273 (Moderna). This study aims to examine differences in the trajectory of CoV-2 spike IgG between the two vaccines and to explore the CoV-2 spike IgG changes for the breakthrough infection.
Methods: A longitudinal study of a cohort of health care providers was launched on December 10, 2020. Blood draws and answers to questionnaires were obtained at baseline, and every 3 months for 18 months. Participants received either mRNA-1273 or BNT162b2. CoV-2 spike IgG were measured at the Remington Laboratory. Student's *t*-test was used for mean IgG comparison between the two vaccines over time, and mixed-effect linear regression models were conducted to explore factors associated with changes of CoV-2 spike IgG titers following the full dose. Breakthrough COVID infection was identified by the nucleocapsid antigen tests. Paired *t*-test was used to compare mean IgG before and after infection and between infected and its matched noninfected group.
Results: Among 532 CoV-2 IgG participants, 99.6% seroconverted with either vaccine. Following the second dose, mRNA-1273 showed higher CoV-2 spike IgG titers and a slower decay than BNT162b2. Following the booster, IgG titers peaked at similar levels between both vaccines, but a slower decay was observed in mRNA-1273 than BNT162b2. Mean IgG following the booster decreased more slowly than after the second dose for both vaccines. Modeling results indicated a lower mean IgG and a faster decrease of IgG for those with autoimmune disease. Nucleocapsid antigen test results on 377 participants showed a 25.5% breakthrough infection rate after the second dose, with 23.2% for BNT162b2 and 27.0% for mRNA-1273 (P=0.405). The infection group showed a significantly lower mean IgG level than its matched noninfection group during the same time window before infection.
Conclusion: Participants in the mRNA-1273 group received a total of 250 μg of mRNA, while those in the BNT162b2 group received 90 μg. The higher antigenic content in mRNA-1273 may explain its higher means and slower decays. Our study supports that there may be a direct correlation between the amounts of mRNA CoV-2 IgG levels and protection against COVID-19 infection.

Matching by HIV Status in a Retrospective Cohort Study

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Background: Retrospective cohort studies of people with HIV (PWH) may include comparison groups of people without HIV (PWoH). A common matching approach is to exclude those with evidence of HIV over follow-up from the pool of unexposed,

but this limits generalizability and may induce bias. Herein, we performed exposure density sampling using retrospective data that emulates how matching would be done prospectively.
Methods: We performed exposure density sampling by HIV status in an ongoing retrospective cohort evaluating cardiovascular disease. Eligibility included age of ≥18 years and ≥1 year membership during 2000–2021 in two integrated health systems. For each PWH, we identified 20:1 concurrently enrolled PWoH frequency-matched by race/ethnicity, sex, year of birth, health system, and years enrollment prior to baseline (ie, date when PWH first met study eligibility). Similar to a prospective cohort, we excluded potential matches if they were already included (ie, matched to another PWH). If someone was selected as unexposed and later had incident HIV, that person was included for the duration of time without HIV and censored at HIV diagnosis.
Results: In Kaiser Permanente Northern California (KPNC), we identified 17,989 PWH and 359,780 PWoH with similar race/ethnicity (16% non-Hispanic Black, 47% non-Hispanic White, 21% Hispanic), sex (10% women), baseline age (mean of 42 years), and years enrollment (31% with ≥3 years). In Kaiser Permanente Mid-Atlantic States (KPMAS), we identified 7639 PWH and 152,780 PWoH with similar race/ethnicity (57% non-Hispanic Black, 11% non-Hispanic White, 6% Hispanic), sex (30% women), baseline age (mean of 41 years), and years enrollment (21% and 26% with ≥3 years for PWH and PWoH). Among PWoH, 712 (0.2%) in KPNC and 582 (0.4%) in KPMAS had incident HIV infection and were censored in our analysis at the time of HIV infection. Alternatively, the exposed person-time could have been retained with a time-dependent covariate for HIV status during follow-up.
Conclusion: Exposure density sampling using retrospective data is feasible across diverse health systems. Our method resulted in a modest loss in efficiency since those with incident HIV infection among the initially selected unexposed group were censored at the time of HIV infection, but the benefit is a final comparison group that is representative of the pool of PWoH at the time PWH were identified.

Disparities in COVID-19 Severe Outcomes Among Asian American and Pacific Islanders in a Large Health Care System in California

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Background: The COVID-19 pandemic has disproportionately impacted racial and ethnic minorities in the United States, including Asian Americans and Pacific Islanders (AAPIs). However, few studies have highlighted these disparities among AAPIs, nor disaggregated these disparities by AAPI ethnic subgroups. This study aimed to assess variation of AAPI COVID-19 testing and outcomes compared to non-Hispanic Whites (NHW).
Methods: This retrospective, cross-sectional study utilized the electronic health records (EHR) from all patients tested for SARS-CoV-2 (n=556,690) in a large health system in Northern and Central California between February 20, 2020, and March 31, 2021. Chi-squared tests were used for testing differences in the severity of COVID-19 (hospitalization, intensive care unit [ICU] admission, death) and patient demographic and clinical characteristics across the AAPI subgroups and NHW. Unadjusted and adjusted odds ratios (OR) were estimated for measuring effect of race ethnicity on severity of COVID-19 using multivariable logistic regression.
Results: SARS-CoV-2 positivity of Asian subgroups varied from 4% in the Chinese and Korean populations to 11.2%, 13.5%, and 12.5% for Asian Indian, Filipino, and other Asian, respectively. Pacific Islanders had the greatest subgroup test positivity at 20.1%. Among AAPI patients with COVID-19 disease, Vietnamese (OR:2.06, 95% CI: 1.30–3.25), other Asian (OR: 2.13, 95% CI: 1.79–2.54), Filipino (OR: 1.78, 95% CI: 1.34-2.23), Japanese (OR: 1.78, 95% CI: 1.10–2.88), and Chinese (OR: 1.73, 95% CI: 1.34–2.23) subgroups had almost double the odds of hospitalization compared to NHW. Pacific Islander (OR: 1.58, 95% CI: 1.19–2.10) and AAPI mixed-race subgroups (OR: 1.55, 95% CI: 1.10–2.20) also had increased odds of hospitalization compared to NHW. Differences in ICU admission or death among hospitalized patients by different Asian subgroups were not significant.
Conclusion: Variation of COVID-19 testing and hospitalization by Asian subgroups was striking in our population-based study. A focus on the AAPI population with disaggregation of subgroups is crucial to understand nuances of health access, utilization, and outcomes among Asian subgroups to create health equity for these underrepresented populations.

MATERNAL, CHILD, ADOLESCENT & FAMILY HEALTH

Adverse Childhood Experiences Screening in Pediatric Primary Care: From Pilot to Full Scale Within Kaiser Permanente Southern California

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Background: Screening for adverse childhood experiences (ACEs) in pediatric primary care has been implemented within Kaiser Permanente Southern California (KPSC) in response to consistent evidence of the deleterious impact of ACEs on health. Herein, we describe the results from our analyses that supported the scaling of pediatric ACEs screening from pilot to full regional implementation.
Methods: Based on early learnings from the pilot that began in June 2018, an updated ACEs screening and referral process was tested at 1 clinic in February 2021. This expanded into a phased

rollout in June 2022 at 28 clinics (Phase 1) and June 2023 at the remaining 61 clinics (Phase 2). Segmented logistic regression was used to test the change from the original workflow to the updated workflow at 1 clinic in February 2021. Poisson regression was used to test the rates in referrals to social work, visits to social work, and visits to behavioral health between newly screening clinics (Phase 1) and nonscreening clinics (Phase 2), June 1–December 31, 2022, as well as between Phase 1 vs Phase 2 clinics, June 1–October 31, 2023, to understand longer-term stability.

Results: The updated workflow increased the receipt of behavioral health services 7.5 times (95% CI: 1.55, 36.2) compared to the original workflow. Initiation of ACEs screening in June 2022 at Phase 1 clinics significantly increased the rate of referrals to social work (risk ratio [RR]: 1.48, 95% CI: 1.25, 1.74) but did not significantly increase the rate of social work visits (RR: 1.16, 95% CI: 0.99, 1.36) or behavioral health visits (RR: 1.03, 95% CI: 0.99, 1.07) compared to nonscreening (Phase 2) clinics. There were no differences between the Phase 1 (2022 start) and Phase 2 (2023 start) clinics in the rates of referrals to social work (RR: 1.07, 95% CI: 0.90, 1.28), visits to social work (RR: 1.03, 95% CI: 0.87, 1.23), or visits to behavioral health (RR: 1.03, 95% CI: 0.96, 1.10) among children with positive ACEs screens in 2023.

Conclusion: Overall, our research has provided the evidence necessary to move the ACEs screening from pilot to full-scale adoption. Given that there was not a significant increase in the social work or behavioral health resources needed after ACEs screening initiation, this work provides first evidence of the feasibility and sustainability of large-scale ACEs screening programs.

Health Equity in Action: Personalized Pediatric Care Using Sensory-Friendly Vaccine Clinics

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Background: Autistic pediatric patients and those with intellectual and developmental disabilities, needle phobia, and other sensory processing disorders face challenges in accessing routine and urgent medical care. Sutter Health's clinicians and operations staff saw that these patients with sensory needs were not receiving access to immunizations, particularly the COVID-19 primary vaccine series.

Methods: Two vaccination centers were created and designed in a sensory-friendly way for patients to receive immunizations safely and effectively. Prior to the appointment, parents/caregivers are asked to complete a previsit questionnaire that includes questions regarding special accommodations. At the appointment, the patient interacts with specially trained staff and is provided extra time for the encounter. Parents/caregivers could complete a paper or QR code survey at the end of their appointment about their experience. We utilized the electronic health record to determine how many referral orders were placed and completed. Interviews with willing parent/caregivers were conducted to understand their experience in more depth.

Results: From April 2022 to April 2023, 226 referrals were made to a sensory vaccine clinic; 127 visits to a sensory clinic were completed for 98 individual patients. We received 88 postvisit surveys from parents/caregivers; 67% provided a 9 or a 10, showing that they were very satisfied with their child's overall experience at the vaccine clinic, and 86% (mean: 9.5) indicated they were very likely to recommend the clinic to others. We also conducted 24 interviews with parents/caregivers. We heard from most interviewed parents/caregivers about appreciation for the clinic in that it made the process "easier" for patients and parents/caregivers, and some indicated that they now have more confidence that they can get all the necessary vaccinations for their child.

Conclusion: Overall, parents/caregivers report that both they and their child are having a better experience receiving vaccines from a sensory-friendly clinic. This has been able to make care more accessible to all children to improve their personal health and has provided them with a better health care experience.

Factors That Influence Provider Use of Nutrition and Physical Activity Counseling During Well-Child Visits Among Young Children at Risk for Obesity

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Background: The life course health development framework recognizes childhood as a critical period for establishing health trajectories. Pediatric care providers are positioned to offer surveillance, screening, and preventive counseling within a family-centered approach. We evaluated factors associated with provider use of nutrition and physical activity counseling during well-child visits (WCV).

Methods: Geisinger electronic health records for children (3–5 years of age) from lower-income households with body mass index (BMI) above the 50th percentile were evaluated for WCV documentation of weight assessment as well as counseling for nutrition and physical activity (CNPA), via Healthcare Effectiveness Data and Information Set (HEDIS). Factors evaluated for association with CNPA included provider (clinic type, number of patients, age, sex, BMI, race, attitudes about obesity), patient (age, sex, race, language, BMI percentile, public insurance), and parent (race, BMI). Provider factors were compared between providers with >20% vs <20% of patients with CNPA. After limiting to providers with >20% CNPA, patient/parent factors were compared between those with/without documented counseling.

Results: Weight assessment was complete for 100% of the population, and 60% had documented CNPA (527 of 881 patients). Provider factors associated with increased CNPA included pediatric providers (vs family practice; P<0.0001), age of <55 years (P=0.0004), female sex (P=0.0002), lower BMI (P=0.041), increased prevalence of provider attitude

that it is difficult to treat and prevent obesity (P=0.0094), and providers who rate their own skills as lower in treating obesity (P=0.035). Among providers with higher CNPA documentation, patients with public insurance were more likely to have CNPA as compared to those without public insurance (88% vs 77%; P=0.0010). In those with public insurance, patients with BMI above the 85th percentile were more likely to have CNPA (94% vs 87%; P=0.017). Parent factors were not significantly associated with CNPA.

Conclusion: Nutrition and physical activity counseling offers a family-centered approach to screen and provide timely guidance for health promotion. Our results suggest provider and patient factors are associated with preventive counseling among children at risk for obesity. Future research should address barriers and facilitators to improve utilization of preventive counseling and advance health equity.

Self-Reported Depression Treatment Among Patients With New Episodes of Depression During Pregnancy

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Background: Although psychotherapy and antidepressant medication can improve depression symptoms, <50% of pregnant persons with new episodes of depression initiate these treatments. There is limited information on the use of alternative strategies to manage depression in pregnancy. We conducted a survey of depression management strategies used by patients with a new episode of depression during pregnancy.

Methods: Using electronic health records (EHR) from 5 U.S. health systems (2022–2023), we identified patients who had a depression diagnosis during pregnancy with no depression diagnosis, no antidepressant dispensings, and no psychotherapy in the 6 months before pregnancy, spoke English or Spanish, had health insurance coverage 6 months before pregnancy through delivery, had a live birth, and were 2–4 months postpartum. Individuals were mailed or emailed the survey invitation and were invited to complete the survey online or on paper on the strategies they used to manage their depression and mood during pregnancy, including antidepressants, individual psychotherapy, and alternative strategies.

Results: Of the 339 patients who participated (26% of invited), 125 (37%) were non-Hispanic White and 186 (55%) had a college degree or higher. Overall, 52% reported using health system resources for depression during pregnancy: 30% reported individual psychotherapy only, 12% reported antidepressants only, and 10% reported both. Partner/family support was the most common alternative strategy (83%), followed by mindfulness, relaxation, or exercise (71%), online therapy/counseling or other therapy (40%), complementary and alternative medicine (37%), community support (34%), herbs, supplements, or diets (22%), other prescription medications (2%), other medical therapies, programs, or hospitalization (2%), and e-health interventions (1%); 88% reported ≥1 alternative strategy other than partner/family support.

Conclusion: Nearly all patients with a new depression episode reported using at least 1 alternative strategy to manage their depression during pregnancy. Alternative strategies are not routinely collected in EHR and their use may not be known by clinicians and researchers. Provider awareness, documentation, and follow-up of alternative depression management strategies in EHR may improve patient care.

Development of a Conceptual Model to Measure Family Caregiving for Children With Chronic Health Conditions

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Background: More than 15% of children suffer from chronic health conditions (CHC). Children with CHCs (eg, autism spectrum disorder [ASD]) often require higher-intensity caregiving than other children. Ongoing caregiving demands have long-term consequences for the emotional and financial health of families. Few studies have directly measured the time parents spend caregiving for their children with CHCs.

Methods: Using qualitative data from 2 studies, we developed a conceptual model of the domains of caregiving time families experience when they have children with a CHC. We used qualitative data from the r-Kids study, which included 1421 parents of children from 3 Kaiser Permanente regions and the OCHIN network of safety-net clinics in 3 groups (children with ASD, asthma, and a control group without a CHC) as well as data from a pilot study that conducted qualitative interviews with 50 parents of children with ASD and other mental health conditions. We used thematic analysis to identify different types of caregiving parents experienced.

Results: Study samples included 1421 parents from the r-Kids study and 50 parents from our pilot study. We identified several domains of caregiving. Parents reported caregiving activities related to components of their child's lives such as childcare,

school, at-home care, and medical care. All parents discussed spending time caregiving in each domain. However, the extent of caregiving time and the specific activities discussed were different for parents of children with a CHC. We identified some activities that were unique to specific CHCs. We identified several themes that modified the caregiving experience, such as financial resources, family support, and work obligations. We also explored differences in caregiving by family socioeconomic status and by race/ethnicity.
Conclusion: Our findings suggest that parents of children with a CHC provide multiple types of caregiving. Some domains (eg, time related to medical visits) are well known; other activities, such as at-home care, are less well understood. Having a conceptual model can guide the development of surveys and help to make sure a comprehensive picture of family caregiving is accounted for in future studies.

PATIENT ENGAGEMENT IN CARE, RESEARCH

The Patient-Engaged Research Center: A Path Toward Self-Sustainable Patient Engagement in Care and Research

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Background: Despite growing acknowledgment that patient engagement (PE) in care and research is important, models showcasing how health systems can sustain long-term PE across such projects remains scant. The Patient-Engaged Research Center (PERC) provides an example of a replicable and sustainable funding model to establish and maintain PE in care and research within a health system and abroad.
Methods: Within the current infrastructure, Henry Ford Health's PERC has 2 arms (research, program operations) that work together to provide a bridge between patients (including caregivers and family) and the health system. The research arm houses researchers with expertise in PE and patient-centered methodologies who spearhead and support patient-centered research projects across the system. Within the program operations arm, project management staff recruit, onboard, and train patients to engage in care and research projects through its Patient Advisor (PA) Program. In order to be self-sustainable, PERC has developed an intake process (awareness, intake, project type, and project path), with a fee for service based on the needs of the project.
Results: In its 10th year of operation (initial startup funding long expired), PERC has established itself as the go-to resource within the health system for PE and maintains a staff of 3 researchers and 3 program operations team members, with plans to hire additional staff. In 2023, PERC's research arm received 28 intake invoices for collaboration and is currently receiving funding to support 17 care and research projects, including projects funded by the National Institute of Health, Patient-Centered Outcomes Research Institute, and the National Cancer Institute. The program operations arm receives funding annually from research along with operational and clinical divisions to sustain the current infrastructure and to grow the PA Program (431 patients, caregivers, and family) and 29 Patient and Family Advisory Councils (groups of ~10–15 PAs who meet regularly) that provide patient voice in care and research across the health system.
Conclusion: PE in clinical care and research within most health systems remains siloed and disjointed, where those wanting to incorporate PE are left to do so on an individual basis. PERC provides a promising and replicable example by which health systems, and the broader community, can feasibly sustain and grow PE across clinical care delivery and research in a more efficient and cohesive manner.

SOCIAL DETERMINANTS OF HEALTH

Development and Utilization of Content Validity Index for the Vaccine Hesitancy and Perception Scale Toward COVID-19 Vaccines

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Background: To address COVID-19 vaccine hesitancy, researchers need to understand why adults are hesitant to accept COVID-19 vaccines. The study aim was to develop a COVID-19 vaccine hesitancy measurement instrument, as it requires a different vaccine hesitancy scale than a generalized vaccine hesitancy scale. To date, there is no gold standard COVID-19 vaccine hesitancy instrument.
Methods: To develop the survey, we utilized the Health Belief Model, Theoretical Framework, SAGE Working Group, and literature. In all, 9 subject matter experts (SMEs) from various health care and clinical research fields were invited to participate and provide their feedback. The SMEs performed content validity index (CVI) by evaluating each item per level of relevancy measuring vaccine hesitancy for the COVID-19 vaccine via Qualtrics. Face validity also was performed using self-identified COVID-19 vaccine-hesitant and -nonhesitant individuals. The pilot survey was administered via a convenient sample via Qualtrics. Test/re-test analysis was performed 2 weeks following the initial survey. Factor analysis was performed.
Results: The initial survey consisted of 74 items; 39 items were dropped and 10 items were paraphrased after SME feedback. The CVI of the instrument was 0.87, indicating strong content validity. The instrument currently consists of 35 items and is being piloted among a convenience sample, with 352 responses. Test/re-test data were collected on more than 70 participants. After test/re-test, 29 items remained. After factor analysis, 2 factors emerged, with 26 items total. For factor 1, the internal consistency value ranged from 0.948 to 0.962, with alpha value of 0.955. For factor 2, the internal consistency value ranged from 0.917 to 0.939, with alpha value of 0.929, indicating excellent reliability. Factor 1 measured COVID-19 vaccine hesitancy, and factor 2 measured the perception of trust in the

COVID-19 vaccine.
Conclusion: This study illustrates the development of the vaccine hesitancy scale may assist policymakers and health care providers in the reasoning behind vaccine hesitancy during the COVID-19 pandemic.

Patient Perceptions of Health-Related Social Needs and General Health Data Use in Research: A Cross-Sectional Survey Research Study

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Background: Health systems screen patients for health-related social needs (HRSN) and document these data in electronic health records (EHR) to improve health. Patient confidence in privacy protections for research conducted with these and other EHR data is needed. We surveyed patients to understand their views on HRSN and other health data used in research and to examine the impact of rurality and mistrust.
Methods: In this cross-sectional survey research study, we developed new items and used or adapted items from published surveys, including 5 financial, food, and transportation-related HRSN items, the 7-item Medical Mistrust Index, and items on health data use and sharing for research. We invited a convenience sample of 7111 Essentia Health patients to take an online survey in REDCap from July 11, 2023, to October 13, 2023. Eligible patients received up to 5 reminder emails but no stipend. We described response frequencies to a subset of survey items and explored relationships between responses to those items and rurality and medical mistrust (and having ≥1 HRSN data point for EHR storage and use) with race-, age-, and gender-adjusted logistic regression in IBM SPSS 29 (alpha of significance: P<0.05).
Results: Of 682 adults (≥18 years old) taking the survey, 94% were White, 69% female, 63% 45–74 years of age, 44% employed, 37% retired, 90% completed some college, 28% lived rurally, and 26% reported ≥1 HRSN. Most respondents were comfortable with EHR data being shared with researchers if personal information was de-identified (95%, falling to 63% when identified) and with HRSN data being stored in the EHR and available to researchers (77%). Most thought sharing de-identified EHR data was important for helping others (97%) and making new therapies available faster (99%). More medical mistrust was significantly associated with lower odds of affirmative responses on most items, though not for making new therapies available faster. Rurality had no impact on these items. Having ≥1 HRSN also had no impact on opinions on HRSN data storage and research use.
Conclusion: Health system patients supported the use of EHR and HRSN data in research, particularly if de-identified. Rurality did not impact responses, but higher medical mistrust did, except for new therapies, an item with broad support. Responses may be biased to those who wanted to participate in research. Future research with stipends or quality improvement projects may lead to more diverse responses.

Association of Social Needs With Worse Outcomes in Medically Complex Patients

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Background: Integrated health systems such as Kaiser Permanente Northern California (KPNC) have begun major investments to identify and address social needs, especially in high-cost patients with multiple medical conditions. We sought to evaluate the relative contribution of social risk on 1-year utilization outcomes in a cohort of medically complex KPNC members.
Methods: We analyzed adults with high medical complexity (defined as high comorbidity, high predicted risk of hospitalization, and prior emergency department [ED] admissions) in KPNC from Janaruy 15, 2023, to December 15, 2023. From the population of patients with high medical complexity, we identified a cohort of patients who met additional criteria for either clinical complexity (eg, 7+ medications, poor disease control) and/or high social risk (eg, requiring medical financial assistance, self-reported social barriers to care). We fit negative binomial regression models to test the associations between clinical and/or social risk and inpatient (eg, hospital, ED, treat and release) and outpatient (eg, primary care provider [PCP], specialty, mental health visits).
Results: We identified 65,806 high-need KPNC adults with clinical complexity and/or high social need (42,265 clinical, 6804 social, 16,737 clinical and social). The mean age was 71 years (73 vs 57 vs 70; P<0.001); 18.2% were Hispanic (15.3% vs 26.3% vs 22.2%; P<0.001), 11.4% were Black (8.7% vs 17.6% vs 15.5%; P<0.001), 10.3% were Asian (10.7% vs 9.4% vs 9.8%; P<0.001), and 55.2% were White (60.2% vs 42.2% vs 47.9%; P<0.001); 4.0% were Medicare and Medicaid dual eligible (3.4% vs 1.7% vs 6.3%; P<0.001). In adjusted analyses, compared with individuals with only clinical risk, individuals flagged for clinical and social factors had the highest incidence of inpatient admissions (incidence rate ratio: 1.2; P<0.001), ED visits (1.2; P<0.001), treat and release ED visits (1.2; P<0.001), PCP visits (1.1; P<0.001), and mental health visits (1.1; P=0.013).
Conclusion: Patients with clinical complexity and social need were more likely to be newer to Medicare (eg, 65–74 age range) and dual eligible. They used more inpatient and outpatient health care. Quantifying the utilization impact of increased social risk among the most medically complex will help policymakers and clinical leaders refine care management selection algorithms and plan social resource allocation.

Alternative Approaches to Identification of Social Risk

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Background: Evidence suggests that social determinants of health (SDOH) vulnerabilities, such as housing insecurity, increase a child's risk of developing health concerns and of missing services. Health systems play a critical role in identifying children with these risks. Although individual SDOH screening is considered the best way to identify children with social risk, many children are never screened.
Methods: As part of an observational pilot study, we compared 3 approaches to identifying social risk in children: 1) identify screens linked to child's electronic medical record (EMR); 2) identify screens linked to child or parent; and 3) use of a community-level measure, the Child Opportunity Index (COI). The COI uses routinely gathered administrative data to provide SDOH vulnerability scores. We used 2022–2023 data from the Kaiser Permanente Northwest health system. This analysis examines how many children were identified using each method, and whether much overlap in children categorization exists between these 3 approaches. The study population included current members 0–17 years of age and their parents.
Results: Preliminary analyses indicated that of the 100,269 youth included, less than 1% had an individual SDOH screening linked to the child's account. When SDOH screening data from both parent and youth were included, this increased dramatically, providing SDOH information on closer to 40% of youth. We were able to calculate COI scores for almost all youth. About 20% of the youth had a COI score indicating SDOH vulnerability (COI low or very low). Additional analyses underway will compare whether each method identifies the same group of youth with social risk.
Conclusion: Health systems need information about what works to identify youth with social risk so that these risks can be addressed in a timely way.

Changes in Health-Related Social Risks and Needs and Self-Reported Health Over Time: Results From the Kaiser Permanente National Social Health Surveys

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Background: Social determinants of health manifest downstream as individual health-related social risks and needs such as food insecurity, housing instability, and transportation barriers. To develop effective interventions, health systems need precise population estimates. Currently, most of the social health literature reflects cross-sectional and opportunistic assessment among specific subpopulations.
Methods: We conducted a longitudinal and representative survey of social risk, need, and physical and mental health among Kaiser Permanente (KP) members nationwide. In 2020, 43,936 members were sampled equally from each region, with half from a high social adversity risk group. The initial survey was a 3-phased web, phone, and paper survey in both Spanish and English. In the 2022 follow-up, we resurveyed all living respondents using the same approach. Risk, need, and self-reported mental and physical health were calculated using weighted estimates both overall and within risk/need domains. We used multinomial logistic regression models to assess the relationship between risk and need over time and with self-reported physical and mental health.
Results: In 2020, the final survey had n=10,274 respondents; in 2022 it was n=6317, exceeding our 50% target. Prevalence of any food, housing, or transportation risk was 30% in 2020 and 26% in 2022 (risk difference: 3.69%, 95% CI: 5.74%, 1.65%; P<0.001). Those with any risk in 2020 were 2.87 times as likely to report Fair or Poor physical health over Excellent (95% CI: 2.30, 3.57); in 2022 those with any risk were 4.72 times as likely to report Fair/Poor physical health (95% CI: 3.59, 6.21). For mental health, those with any risk were 3.91 as likely to report Fair/Poor mental health over Excellent (95% CI: 3.17, 4.83); in 2022, those with any risk were 5.96 times as likely to report Fair/Poor mental health (95% CI: 4.57, 7.77). Overall and within-domain risk was significantly associated with worse physical and mental health over time; this pattern often did not hold for need.
Conclusion: Among this representative sample of KP members, social risk decreased from 2020 to 2022 but remained high, with more than 1 in 4 individuals in this insured population having risk. Members with risk in 2022 had significantly worse physical and mental health compared to 2020. Future interventions should consider that risk and desire for assistance (need) have distinct relationships with health over time.

Qualitative Patient Perspectives on Kaiser Permanente's Medical-Legal Partnership Initiative

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Background: Kaiser Permanente (KP) integrated robust medical-legal partnerships (MLP) into clinical workflows to build capacity of the community-based legal aid ecosystem to tackle housing instability and eviction risk for their members and communities. This evaluation tested the MLP model to demonstrate operational viability and to assess the impact on patients and their health care utilization.
Methods: The mixed-method, cross-sequential evaluation included a qualitative interview with study participants who were outreached and served by a community legal partner after referral through the KP workflow established for the initiative. The 30- to 45-minute semi-structured phone interviews delved extensively into patient reports of their experiences, perceptions, and legal, housing, and health outcomes. The convenience sample was selected from cases that were closed by the legal provider, prioritizing those who had also completed surveys, and were invited via email and phone to take part in the recorded interview. Transcripts and notes were analyzed using qualitative content and theme analysis. Participants received a $30 gift card incentive.
Results: A subsample of 10 patients reported positive

experiences, citing their lawyers' promptness, communication, and dedication to resolving the issue. Some participants, however, saw the referral-to-service process as complex and lacking continuity and support for their unique issues. Of the 10, 5 participants had their issues resolved through legal aid, 2 had their issues resolved without legal aid, and 3 did not have their issues resolved. Participants with issues resolved by legal aid reported improved mental health (reduced stress, depression, and anxiety), improved physical health (improved mobility, weight correction, and improved sleep), and reduced social needs burden (improved housing, finances, and food access). Participants with unresolved issues indicated that interaction with legal aid exacerbated their mental health challenges.

Conclusion: Participants with resolved legal issues experienced positive legal, physical, mental, and social health outcomes; however, those with unresolved issues reported frustration and worse mental health. Participants appreciated meaningful follow-up and holistic discussion. Findings also had implications for well-timed communications and referrals to prevent evictions and downstream health impacts.

Social Determinants of Health ICD-10 Code Utilization Across Health Systems

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Background: Social determinants of health (SDoH) are associated with higher health care utilization and costs and worse health outcomes. ICD-10 codes are a standardized way to document SDoH in health care settings, but usage is low and documentation prevalence differs by population subgroups. We add to prior studies by using data from multiple visit types covered by multiple payers in 12 U.S. health systems.

Methods: Using data from January 2016 to December 2021, we described documentation of 11 SDoH categories: abuse/neglect, educational issues, employment/financial issues, exposure to violence, housing instability, legal issues, family alcohol/drug use, family disruption by separation/divorce, other family issues, social environmental issues, and nonspecific psychosocial needs. We assessed documentation changes over time using chi-squared tests for trend in proportions, compared documentation in 2021 by sex, age, race/ethnicity, and site using Fisher's exact tests/chi-squared tests, and compared mental health outcomes in 2021 among all patients to those with documented SDoH ICD-10 codes using exact binomial tests/1-proportion z-tests.

Results: Documentation of any SDoH ICD-10 code significantly increased from 1.7% of patients in 2016 to 2.7% in 2021, as did documentation in all categories except educational issues. In 2016 and 2021, the most frequently documented categories were other family issues (2016: 0.6%; 2021: 0.9%) and abuse/neglect (2016: 0.3%; 2021: 0.5%). Documentation significantly differed by sex, age, race/ethnicity, and site. Documentation was often higher among females and other/unknown sex than among males and among American Indian/Alaskan Native, Black/African American, and Hispanic individuals than among other race/ethnicity categories. More educational issues were documented in younger ages and more social environmental issues in older ages. Mental health-related diagnoses, emergency room visits, and hospitalizations were more common among those with documented SDoH.

Conclusion: As in previous work, SDoH ICD-10 code documentation was low and differed by population subgroups. More work is needed to understand whether differences reflect variation in documentation practice or actual SDoH prevalence, but our results show the need for standardized, systematic SDoH documentation methods in health care settings to better understand SDoH prevalence and when to intervene to address SDoH.

Privacy-Preserving Record Linkage in Community Settings: Merging Electronic Medical Record and Homeless Management Information System (HMIS) Data

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Background: Sharing data across sectors, especially data that include identifiable information, can be challenging. Privacy-preserving record linkage (PPRL) allows individuals to be matched across datasets using cryptographically hashed identifying information. We used this technique to explore how characteristics of homelessness were associated with health status and health care utilization.

Methods: We merged Epic electronic medical record (EMR) data from a regional health system in Oregon with data from the local U.S. Department of Housing and Urban Development (HUD)-designated community action agency's Homeless Management Information System (HMIS). The EMR dataset included measures of health care utilization for which we had complete coverage in the region (urgent care visits, emergency departmtent [ED] visits, and hospitalizations) as well as indicators of mental health and substance use diagnoses. The HMIS dataset included assessments of social

history and vulnerability. We used the R package "PPRL" to cryptographically hash first name, last name, and date of birth. A neutral third party then merged the two hashed datasets to identify individuals represented in both sources.
Results: At a matching threshold of 0.85, a total of 775 individuals were identified in both the Epic EMR dataset (20% of the original 3873 individuals flagged as homeless in 2022) and the HMIS dataset (29% of the original 2710 individuals that received services in 2022). Individuals in the merged dataset were 58% male and 88% White. Individuals with a high vulnerability index score were more likely to have 2 or more ED visits in 2022 compared to people with a low vulnerability index score (48% vs 36%), and were more likely to have 2 or more urgent care visits as well (11% vs 6%). Individuals classified as chronically homeless were more likely to have multiple ED visits (43% vs 29%) and multiple hospitalizations (9% vs 3%) than patients not classified as chronically homeless. Additional analyses are in progress.
Conclusion: PPRL offers a practical, low-cost way to overcome barriers to merging HIPAA-protected identifying information across silos. This technique is feasible in community-based settings and has potential to inform targeted interventions to improve population health outcomes.

STAKEHOLDER ENGAGEMENT

Employing an Advisory Board to Support a Pilot Feasibility Study for Black Young Adults With Type 1 Diabetes

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Background: Community advisory boards (CABs) are essential to integrating community and participant voices into research. The ADAPT-ITT framework outlines advisory board engagement as 1 of the 8 steps to adapting evidence-based interventions for new populations. Employing a CAB helps research teams understand the cultural dimensions of study populations and improves research and program messaging.
Methods: Type 1 Diabetes Education and Support (T1DES) is a pilot feasibility study to address diabetes distress among Black young adults with the goals to 1) tailor an intervention relevant to their experiences managing type 1 diabetes, and 2) test the intervention for feasibility and diabetes outcomes. T1DES employed a CAB resembling T1DES' sample population, Black young adults 18–30 years of age with type 1 diabetes. CAB members meet quarterly over the 3-year study period to participate in intervention development and implementation, including helping develop study messaging, theatre-test intervention sessions, and provide input on ongoing study activities. CAB members are paid a $50 gift card for each 1-hour virtual meeting.
Results: During development phase the CAB adapted intervention content, theatre-tested the intervention to identify updates needed to support T1DES' cultural responsiveness to Black young adults with type 1 diabetes, acted as study participants during facilitator training, and developed the content and cadence for text messages. The CAB wrote a new narrative to be used in the intervention to use as an example narrative that more closely mimicked their own experiences. Other intervention updates were changing the order of session content and updating content to include discussion of advocating for accommodations at school or work. The CAB updated the study's text message content to include recipe ideas, tips for pump site patches, and tips on carb counting and also recommended sending more text messages over the intervention period.
Conclusion: Employing and working closely with an advisory board strengthens intervention adaptation, study recruitment, and study engagement and improves perceived appropriateness and satisfaction of the intervention content. CAB members must be compensated for their time and need clear, concise meeting agendas and goals ahead of each meeting.

STUDY DESIGN

Development and Utilization of a Face and Content Validity Index to Assess a General Adult Vaccine Hesitancy and Perception Tool in the United States

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Background: Despite proven benefits, suboptimal vaccination coverage persists in the United States. This study aimed to create a comprehensive adult vaccine hesitancy tool to better understand perceptions and improve uptake amid fully funded and accessible services.
Methods: Hesitancy surrounding vaccination is a complex interaction of behavioral and societal factors, an intersection that has not been comprehensively studied for the adult population surrounding general vaccination. A vaccine hesitancy instrument was developed after thoroughly examining literature on vaccination hesitancy. Invitations were sent to 13 subject matter experts (SMEs) from several research institutions to review the tool and return feedback. A content validity index (CVI) was conducted in order to determine the relevance of each item included in the survey tool. A scale-level content validity index (S-CVI) was calculated to assess the validity of the tool in its entirety.
Results: A total of 8 SMEs were responsive and provided feedback on a Likert scale for each of the 38 items, ranging from 4 (highly relevant) to 1 (not relevant). SMEs also provided written feedback for each item and the instrument as a whole as necessary. The item-level CVI scores ranged from 0.38 to 1.00, using a score of 0.80 as the cutoff score to determine individual item validity. Most items had a score greater than or equal to 0.88 and were thus deemed excellent; 5 items were removed due to low CVI scores and face-validity

feedback; 2 items were retained after review by the research team; 3 items were revised after reviewing SME feedback. After review by SMEs and the research team, the general adult vaccine hesitancy tool includes a total of 33 items. The S-CVI score for the entire survey tool was 0.87.
Conclusion: Creating a vital vaccine hesitancy tool is essential to understanding factors that shape attitudes among U.S. adults. Next, the study will pilot-test in Missouri to identify key elements influencing general vaccine hesitancy.

TECHNOLOGY, DIGITAL HEALTH, DECISION-SUPPORT TOOLS

Multiple Stakeholder Perspectives on Patient-Centered Outcomes in the Use of Digital Tools for Chronic Disease Care

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Background: Digital technologies are ubiquitous in our world. For people with chronic conditions, digital tools like telehealth, MyChart, remote monitors, wearables/apps, and algorithm-based decision support are increasingly relevant. To optimize the use of these tools in health care, it is important to understand the benefits and burdens they pose to patients through patient-centered outcomes measurement.
Methods: In partnership with our Community Advisory Council, we conducted a 9-month formative engagement effort in which we met with patients with chronic disease, community members, researchers, and care system stakeholders to understand uses of and desires for digital tools in chronic care. We then convened 2 large virtual roundtables and used the World Café method to explore the concept of patient-centered digital care and opportunities for measuring relevant patient-centered outcomes. All participants were identified via snowball method. We summarized our learnings from this engagement project and provided an opportunity for input and refinement to conclusions.
Results: A total of 49 roundtable participants identified multiple patient-centered outcomes for studying the impact of digital tools in chronic care: accessibility, convenience, quality of care, patient/care team relationships, experiences of bias, health and tech literacy, time burden, shared decision-making, and disease outcomes. Participants affirmed the potential for digital tools to improve patient-centered care as well as the need for careful assessment of physical, language, and cost accessibility, especially for those at risk of marginalization. Participants underlined the need for care systems to enact accessibility strategies and help patients navigate technology barriers. Finally, participants endorsed that outcome measurement should be used to directly improve individuals' health care quality as well as answer future research questions.
Conclusion: Digital tools hold great potential for improving patient-centered care for chronic conditions. However, some patients are at increased risk for exclusion or worsening outcomes if implementation of digital strategies is not carefully assessed. Measuring patient-centered outcomes can help to support future comparative effectiveness research and quality improvement efforts around digital equity.

Preventing Alcohol Use After Bariatric Surgery: An Open Trial for a Technology-Based Intervention

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Background: Although bariatric surgery is the most effective treatment for severe obesity, some patients develop a new-onset alcohol use disorder postsurgery. The purpose of this study was to examine feasibility and acceptability of a technology-based intervention that could mitigate reinitiation of alcohol use, thus preventing the development of an alcohol use disorder.
Methods: A total of 10 patients, between 3 and 6 months post-bariatric surgery, completed 2 15-minute web-based sessions, followed by 1 month of daily text messaging. Intervention content was rooted in psychoeducation (ie, risks of postsurgical alcohol use), motivational interviewing to increase motivation to abstain from alcohol, and development of adaptive coping strategies. Participants completed measures at baseline and postintervention, including a rating on a 0–10 scale of how important it was to them to avoid any alcohol use. Participants also responded to weekly text message questions. Participants also provided feedback during an exit interview.
Results: Most participants (90%) completed the postintervention assessment and exit interview; 9 participants completed 100% of the weekly text message questions. Ratings on the importance of avoiding any alcohol use tended to increase from preintervention to postintervention (8.67 vs 9.67; P=0.08). All participants rated the content in the web-based sessions to be interesting and easy to use. Most participants liked the intervention (88.9%) and found it relevant (88.9%) and useful (88.9%). Most also liked the text messages (77.8%). All participants thought patients would use this intervention postsurgery. Exit interviews supported survey findings about acceptability. A minority of participants suggested including additional nonalcohol-focused content and varying the frequency of text messaging.
Conclusion: This technology-based intervention was feasible to deliver and considered acceptable. Though not statistically significant, ratings of the importance of avoiding alcohol were higher following the intervention, warranting continued investigation of the efficacy of this intervention. Findings will be used to finalize the intervention for a pilot randomized controlled trial.

Using Text Messaging to Ascertain Eligibility for Lung Cancer Screening: Unveiling the Limits of Single Channel of Communication

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Background: Prevalent communication via cell phones may offer opportunities for health systems to efficiently gather the smoking history needed to determine lung cancer screening (LCS) eligibility. Research on text messaging for such assessments is limited, especially among marginalized populations. We explored people's willingness to share tobacco use history via text among diverse sociodemographic groups.
Methods: In 2020, we conducted an online survey of 745 randomly selected people from a U.S.-based Qualtrics panel. The survey asked about cell phone use, tobacco and smoking habits, sociodemographics, and likelihood of responding to text messages from the doctor's office inquiring about tobacco use. Responses were used to determine respondents who were LCS-eligible and dual users of tobacco and e-cigarettes. We report respondents' willingness to respond to text messages regarding their smoking status, categorizing those who reported being "somewhat likely" or "very likely" as being willing to respond. Results were stratified by current tobacco use and sociodemographic characteristics. Chi-squared/ANOVA tests were considered significant at $P<0.05$.
Results: Among respondents, 90% used text messaging; 54% never, 33% currently and 13% formerly smoked; 6% were LCS-eligible; and 64% were dual users. Current smokers were significantly younger, more likely male, and more likey text message users. LCS-eligible respondents were significantly older and less likely to report high income. Dual users were significantly younger, more likely male, less likely to live in rural areas, and more likely to have a college degree or high income. Overall, 83% indicated they would respond to text message inquiries regarding smoking status. Middle-aged respondents were significantly more likely to respond than younger or older respondents (91% vs 84% and 84%, respectively). Respondents with no college degree (83% vs 88%) or low income (81% vs 86% middle and 88% high income, respectively) also were significantly less willing to respond.
Conclusion: Text messaging to assess smoking history shows promise for identifying LCS-eligible individuals. But although no significant differences in willingness to respond to text messages regarding smoking status by gender, race, and residential urbanicity were found, we did find differences by age, education, and income, highlighting how multimodality approaches are needed to ensure equitable LCS access.

Improving Diabetes Self-Management Through a Smartphone App and Health Coaching in Primary Care

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Background: Nearly 30 million Americans have diabetes. Smartphone apps and connected devices can enable remote, on-demand connections with a professional health coach and have the potential to help individuals manage their diabetes. The goal of this study was to test the feasibility and acceptability of using a smartphone app within primary care as a channel to deliver high-quality diabetes management.
Methods: The study was carried out via a pre/postintervention that included 13 patients with uncontrolled type 2 diabetes at TeraPractice, a value-based, virtual-first primary care clinic at Sutter Health, a large health system in Northern and Central California, from June 23, 2021, to May 09, 2022. The participants used a smartphone app connected to glucose monitors, regularly communicate via message with a health coach, and log items related to their diabetes management for 6 months. Outcome measures included but were not limited to patient and clinician experience, quality of shared decision-making (SDM), patient activation, and hemoglobin A1c level in the 6-month follow-up. A paired *t*-test was used to examine mean changes from baseline to follow-up.
Results: High satisfaction, usefulness, loyalty, and quality of SDM, as well as great overall experience, were achieved. More than half of patients responded with the highest possible score on quality of SDM. Patient activation increased 0.7 (on a 4-point scale) after the 6-month intervention. Intervention may help reduce hemoglobin A1c level, especially among those whose baseline hemoglobin A1c was ≥8%. What patients value most included not only tools and resources to identify problems and measure improvement, endless information, and immediate feedback, but also support from a dedicated health coach. Possible ways to improve the program include increasing flexibility, adding more tools, reducing the risk of running out of supplies, making the glucose monitors more accurate, enhancing troubleshooting support, and assigning a back-up dietician.
Conclusion: This intervention study provides direct evidence that a primary care clinic at a large health system can use the smartphone app with health coaching as a channel to deliver high-quality diabetes management to support patients with uncontrolled type 2 diabetes. Future studies should compare the effects of the health coaching vs app alone, as this can impact scalability and development of disease management tools.

Implementation and Evaluation of the Pathway Platform: A Digitally Enabled Care Pathway to Improve Depression Management in Primary Care

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Background: The Pathway Platform, a patient-facing mobile app and clinician-facing electronic health record (EHR) integration, was designed to improve measurement-based care and shared decision-making among patients with major depressive disorder (MDD) and primary care providers (PCPs).
Methods: In this real-world, longitudinal, observational study, data from participants ≥18 years old diagnosed with MDD and with an antidepressant start or switch were collected 6 months retrospectively (preimplementation) using EHRs (control cohort), and 6 months prospectively (postimplementation) using EHRs and the Pathway Platform (Pathway Cohort). Primary outcome was to assess measurement-based care by comparing 6-month utilization of 2- or 9-item Patient Health Questionnaire (PHQ); additional outcomes compared MDD remission and response, health care resource utilization, and patient-provider engagement between cohorts.
Results: The Pathway cohort included 89 patients (80% female) and 24 PCPs; the control cohort included 90 patients (58% female). EHR documentation of ≥2 PHQ assessments over 6 months was significantly higher among Pathway participants vs controls (55% vs 39%; P=0.03). Pathway participants were more likely to receive ≥1 medication change/switch (52%) vs controls (42%) and significantly less likely to have referrals to behavioral health (9%) vs controls (23%; P<0.05). Pathway participants exhibited significant improvement in patient-provider engagement as reported by 13-item Patient Activation Measure scores at 6 months vs baseline (P=0.0004) and demonstrated greater improvements in MDD outcomes with remission and response rates of 45% and 35% vs 29% and 29% in the control cohort, respecitvely, although differences were not statistically significant.
Conclusion: The Pathway Platform improved PCP utilization of measurement-based care, and Pathway patients demonstrated improved patient-provider engagement, improved MDD outcomes, and a reduction in referrals to behavioral health. The Pathway Platform provides a promising approach for improving measurement-based care, shared decision-making, and treatment outcomes for patients with MDD.

Use of Imaging for Patients With Back Pain and Enrolled in a Digital Musculoskeletal Program

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Background: Despite guidelines discouraging imaging for nonspecific back pain, overuse persists. Among several initiatives, physical therapy is considered a credible and patient-aligned alternative to manage back pain. This study compares back pain-related imaging use among participants enrolled in a digital musculoskeletal (MSK) program offering physical therapy and nonparticipants receiving usual care.
Methods: We conducted a retrospective cohort study of adults 18–64 years old, using commercial medical claims data representing more than 100 million lives continuously enrolled in a commercial health plan in 2019–2022. Digital MSK members in the back program were identified using record-linkage tokens. Comparison group members had back-related physician office visit identified via ICD-10 and CPT codes. Digital members were matched to comparison members with similar demographics and baseline MSK-related medical care use. Imaging service use and time to imaging after first back pain diagnosis were compared in the digital MSK and the comparison group using *t*-test and multivariable logistic regression.
Results: Digital MSK participants had significantly lower rates of imaging within 28 days of low back pain diagnosis compared to the nonparticipant group with office encounter (22.9% vs 32.9%, diff.=10%; P<0.001). Digital MSK group members also waited for a significantly longer duration of time prior to their initial imaging orders (71 days vs 32 days, diff.=39 days; P<0.001). Additionally, digital MSK participants were 65% less likely to get imaging within 28 days of back pain diagnosis compared to the nonparticipant group (adjusted odds ratio: 0.35, 95% CI: 0.25–0.48; P<0.001).
Conclusion: Findings from this study suggest that digital MSK program members show better compliance with imaging guidelines for back pain and thereby preventing overutilization of diagnostic imaging and unnecessary harm to patients.

Evaluation of a Pilot Implementing a Virtual Medical Documentation Scribe Service to Improve Clinician Well-Being

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Background: Augmedix is a service that uses smartphones to offer virtual scribes in real time during and/or after clinical visits, aiding in documentation entry directly into the electronic health records (EHR). Given the link between increased EHR work and rising burnout, we aimed to evaluate the impact of Augmedix across specialties in one medical foundation of Sutter Health.
Methods: A total of 114 clinicians participated in both the 2022 AMGA survey and a subsequent survey including 6 well-being questions. A subset of participants agreed to a follow-up interview. Survey outcomes were converted from the original 5-point scales to dichotomous variables, followed by assessment of changes in each outcome between 2 time points using McNemar's chi-squared test. Two researchers trained in qualitative research conducted semi-structured interviews via telephone or video. Two coders identified common themes from the transcribed data of 20 interviews.
Results: After using Augmedix, participants reported a significant decrease of burnout from 52.6% to 34.5% (P<0.0001) and an increase from 43.9% to 68.4% of those who agreed/strongly agreed with "I have the energy to complete my work and get through each workday" (P<0.0001). Similarly, a signficant rise from 32.5% to 55.3% participants agreed/strongly agreed that "The time demands of my role

are sustainable" (P<0.0001). During the interviews, clinicians reported many positive outcomes from Augmedix, including reduced documentation/charting time, improved work-life balance (eg, less work after hours), increased patient engagement (eg, face-to-face time with patients, increased number of seen patients), and time for other tasks. Clinicians suggested areas for improvement, including consistency of assigned scribes and scribe training/skills.
Conclusion: We found primary care clinicians and specialists reported enhanced energy at work, sustainable time demands, and reduced burnout following the implementation of Augmedix. Feedback from interviews underscored the importance of documentation support, emphasizing the scribe's potential influence on clinician well-being, work efficiency, and patient engagement.

Genetic Counselor, Clinician, and Patient Perspectives on Telehealth Cancer Genetic Counseling in a Large Health Care System

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Background: Telehealth options via phone or video for genetic counseling are increasingly accepted but are lacking in perspectives from all 3 groups: clinicians, genetic counselors, and patients. This study explored virtual cancer genetic counseling through interviews to understand the benefits and challenges of telehealth counseling in a large health system in Northern California.
Methods: We began by recruiting active genetic counselors and then reached out to their patients. Patient participants who had received genetic counseling (in-person, phone, or video) between 2017 and 2022 were then identified from electronic health records. We conducted semi-structured interviews with active genetic counselors, their patients, and referring clinicians in primary care and oncology in 2022–2023 about their experience with and preference for telegenetic or in-person counseling. Interviews were audio-recorded, transcribed verbatim, and thematically analyzed using Dedoose. We conducted 22 telephone interviews via telephone with 4 counselors, 11 patients, and 7 clinicians.
Results: We found overall satisfaction with the genetic counseling program and telehealth options from all 3 respondent groups. Reported benefits of telegenetics included patient access and geographic reach, scheduling flexibility, and ease of referral. Specifically, patients appreciated safety, family inclusion, and home sample collection kits, and felt they received emotional support from counselors comparable to what they expect in an in-person setting. Video benefits included visible nonverbal cues, while telephone benefits included easier access for less tech-savvy patients. Telegenetic challenges differed across the 3 groups, with patients reporting difficulty in understanding complex concepts and counselors noting limitations in nonverbal communication and sharing of visual aids. Clinicians did not have specific telegenetic difficulties.
Conclusion: This study found high acceptability of telegenetic counseling among patients, clinicians, and genetic counselors. Most counselors preferred video counseling over telephone, but telephone was seen as comparable to face-to-face options. Potential challenges were noted. We recommend offering various visit types and sample collection options to meet patient needs and preferences.

Secure Messaging Use in the Year Prior to a New Dementia Diagnosis

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Background: DetectCID is a pragmatic trial to improve earlier diagnosis of dementia in primary care by educating care teams, using a tablet-based brain health assessment, and providing postdiagnostic support to patients and families. To plan for postdiagnosis education, we examined patient factors associated with use of patient portal secure messaging in the year prior to a new diagnosis of dementia.
Methods: The study included all patients in Kaiser Permanente Southern California who were newly diagnosed with dementia during 2021–2022. We compared the characteristics of patients who used the KP.org patient portal to secure message with the care team vs not using KP.org and described who was generating the secure message. We selected a random sample of the KP.org messages (10%) closest to and before the dementia diagnosis date for review to determine who generated the message (English speakers: n=406; non-English speakers: n=77). Chart review was performed if we could not determine who generated the message. Summary statistics were generated.
Results: In total, 19,005 new dementia cases were included, with 47% having sent at least 1 secure message using KP.org. Only 3% had existing proxy accounts. Compared to non-English speakers, the rate of KP.org use was higher for English-speaking members who were younger and female. For race, we saw a substantial disparity in KP.org use for Black/African Americans (36%) and Hispanics (42%) compared to Asians (53%) and Whites (52%). Members in the highest quintile of neighborhood deprivation were less likely to use KP.org (English-speaking 14% vs Spanish-speaking 35%), as were patients dually eligible for Medicare and Medi-Cal (English-speaking 44% vs Spanish-speaking 34%). Messages authored by family or friends on behalf of patients occurred for 67% of English-speaking patients vs 92% of non-English-speaking patients.
Conclusion: There were racial/ethnic and socioeconomic disparities in KP.org messaging use in the year prior to patients being newly diagnosed with dementia; most of the messages generated via patients' account were authored by family members. Health systems need to be proactive in educating and assisting families to set up and properly use proxy accounts to coordinate care for their relatives.

Interviews With Clinicians to Understand the Impact of Online Patient Portal Messages on Clinician Well-Being

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Background: Following the COVID-19 pandemic, there has been an exponential increase in the volume of messages that patients send to their clinicians through the online patient portal. Previous research found that the volume of messages is highly associated with clinician burnout, and so we interviewed clinicians to understand factors associated with burnout and identify areas for more targeted training.
Methods: Two qualitative researchers conducted 22 semi-structured interviews via telephone or video calls with clinicians across specialties in a single Sutter Health medical group in 2023. The interviews explored clinician experience with messages from patients through the "MyHealthOnline" (MHO) patient portal. Recorded interviews were transcribed for qualitative analysis. Thematic analysis was used to generate the major categories of participant responses.
Results: Clinicians reported the following challenges related to managing and responding to MHO messages: high message volume, negative emotional content, limited availability of appointments to follow up with patients, and lack of compensation. They noted that they perceive patient expectations about messages are a challenge and may be multifaceted and influenced by the health system, MHO interface, societal technology use, and clinician behaviors. However, they noted that the benefits of MHO messages included ease of follow-up communication and patient gratitude messages. Clinicians suggested a message filtering system, patient education on appropriate messaging and expectations, and protection from message harassment to reduce clinician message burden.
Conclusion: Clinician interviews highlighted that patient message volume and content can impact clinician well-being and contribute to burnout. Efforts to reduce message volume and negative content are essential to help improve clinician well-being.

Lower Opioid Initiation Associated With Participation in a Digital Musculoskeletal Program

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Background: Literature has shown that guideline-adherent, in-person conservative care could improve pain and function and, thus, curb opioid use. However, there is no evidence on whether digitally delivered conservative care can do the same. This study examines associations between a digital musculoskeletal (MSK) program and opioid initiation and prescriptions among opioid-naive adults with chronic MSK pain.
Methods: Using commercial medical and pharmacy claims data from a large commercial claims database that represents more than 100 million lives in the United States, we compared digital MSK program members to matched physical therapy (PT) patients. We matched members on an extensive list of covariates to ensure our comparison group was similar. Our primary outcomes were any opioid prescriptions in the 12-month postperiod and average number of opioid prescriptions per 100 participants.
Results: The final analytic sample included 4195 members and 4195 matched PT patients. The study found that 7.89% (95% CI: 7.07%, 8.71%) of the digital MSK program members had their first opioid prescription after starting the program, compared to 13.64% (95% CI: 12.60%, 14.67%) of the matched PT group members (P<0.001). The digital MSK program members had 16.73 (95% CI: 14.11, 19.36) opioid prescriptions among 100 members after starting the program, while the PT group had 22.36 (95% CI: 19.99, 24.73) opioid prescriptions per 100 members. Digital MSK program group had lower odds (odds ratio: 0.52, 95% CI: 0.45, 0.60) of initiating an opioid prescription and significantly fewer number of prescriptions per 100 participants (beta: -6.40, 95% CI: -9.88, -2.93) versus the PT group after controlling for confounding factors.
Conclusion: The study supports that conservative MSK care delivered digitally demonstrated potentials to decrease opioid initiation and number of prescriptions among individuals with chronic MSK pain.

Electronic Medical Record-Based Chronic Kidney Disease Patient Education and Decision-Support Tool in Primary Care Improves Patient Satisfaction

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Background: We developed and pilot-tested an electronic medical record (EMR)-based decision-support tool for primary care clinicians to discuss kidney disease and its management with their patients diagnosed with chronic kidney disease (CKD). Systems engineering optimized efficient and seamless integration into clinical workflow to ensure uptake.
Methods: The "Encounter Decision Intervention" (EDI) is an EMR-based decision-support tool developed by researchers, clinicians, and patients. This plain-language electronic form aids shared decision-making in primary care encounters by

increasing knowledge of a CKD diagnosis to facilitate care. Patients enrolled into a pilot study were randomized using a prospective, cross-sectional design into either intervention (received EDI) or control (no EDI) arms. Validated survey measures of perceived and objective kidney disease knowledge, CKD-specific stress, and patient satisfaction were measured postvisit. Associations between outcomes and measured characteristics were measured with chi-squared tests, *t*-test, and Kruskal-Wallis.

Results: Among patients (N=74) enrolled in this pilot study, there were no statistically significant differences in demographics, overall kidney objective knowledge (mean: 67% correct, standard deviation [SD]: 15), perceived knowledge (mean: 3.0, SD: 2.1), or CKD-specific stress (mean: 1.9, SD: 0.7) between arms (n=37/arm). Satisfaction scores (on scale of 1–5) were significantly higher for the EDI arm on the measures "clinician communication" (n=30 [81%] for EDI vs n=16 [43%] for no EDI; P=0.002), "satisfaction with care" (n=35 [95%] for EDI vs n=26 [70%] for no EDI; P=0.012), and "satisfaction with clinician" (n=36 [97%] for EDI vs n=29 [78%] for no EDI; P=0.028). All 3 satisfaction domains remained statistically significant in multivariate analysis. Participants rated the EDI highly (mean: 4.1, 95% CI: 3.8–4.4). No participants withdrew.

Conclusion: The EDI was seamlessly integrated into primary care encounters, improving patient's perceptions of clinician communications, overall care, and decision-making quality. This pilot study informed an ongoing clinical trial, funded by the National Institute of Diabetes and Digestive and Kidney Diseases grant, with preliminary results demonstrating the clinical utility of implementing the EDI into prima

Understanding Headset Data From Take-Pause, a Mindfulness-Based Virtual Reality Program to Ease Patient Anxiety in Pediatric Urgent Care

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Background: Reducing anxiety among pediatric patients visiting urgent care may help support not only patients but also parents/caregivers and staff. Take-Pause, a mindfulness-based virtual reality (VR) program, has been shown to reduce patient anxiety in a pediatric emergency department setting. This analysis examines the impact of Take-Pause headset use on patient anxiety in a pediatric urgent care clinic.

Methods: Staff at a Palo Alto Medical Foundation (PAMF) pediatric urgent care clinic identified patients who may benefit from Take-Pause and offered the VR headset while they waited in the exam room. Occasionally, siblings, parents, or staff used the VR headset as well. In the headset, participants were guided through a mindfulness VR experience. They also were asked to rate their anxiety on a scale of 1–10 before and after the VR experience. VR sessions with experience time of ≥1 minute and available pre/post-VR session anxiety scores were included in the analysis. A paired *t*-test was used to compare pre/post-VR session anxiety. Univariable linear regressions were used to analyze the association of the change in anxiety with VR experience time and pre-VR session anxiety.

Results: A total of 120 VR sessions in March–July 2023 were included in the analysis. Participants spent a median of 3.2 minutes (interquartile range [IQR]: 2.3–4.9) in VR experience per session. Compared to participant-reported pre-VR anxiety (median [IQR]: 4 [2–5]), post-VR anxiety decreased significantly (median [IQR]: 2 [1–4]; P<0.001). Linear regressions showed that longer VR experience time was associated with more decrease in anxiety: on average, anxiety decreased by 0.17 with every further minute spent in VR experience [95% CI: -0.01, 0.36; P=0.063]. In addition, participants who reported higher initial anxiety were significantly associated with more anxiety decrease: on average, with 1 point higher in pre-VR anxiety, there was a 0.5-point additional decrease in post-VR anxiety (95% CI: 0.34, 0.67; P<0.001).

Conclusion: Providing a VR mindfulness program via headset significantly decreased participant-reported anxiety in a pediatric urgent care clinic at PAMF. Longer VR use time and higher initial anxiety were associated with more decrease in anxiety. Implementation of Take-Pause shows promise of delivering quick, noninvasive, and nonpharmaceutical interventions to ease patient anxiety in pediatric urgent care.

Pupillometer Technology as a Screening Tool for Neurodevelopmental Disorders: Real-World Application in a Pediatric Clinical Setting

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Background: Differences in the pupillary light reflex (PLR) have been implicated as a biomarker of autism spectrum disorder (ASD). However, PLR measures have not been used as an ASD screening tool in standard clinical care. The current study used U.S. Food and Drug Administration (FDA)-approved automated pupillometer technology to assess the PLR in children with ASD and other neurodevelopmental disorders (OND) in a pediatric setting.

Methods: We assessed PLR using the Neuroptics NPi-200 just before regularly scheduled appointments. Diagnoses, Social Responsiveness Scale (SRS) scores, and medication use (no meds, single prescription, polypharmacy) were curated from the health record. Several pupil metrics were captured in N=201 pediatric patients across 3 diagnostic groups: ASD (n=85; average age: 11.4 [range: 6–17] years), ASD with intellectual disability (ASD-ID; n=32; average age: 11.19 [range: 7–16] years), and OND with or without ID (n=84; average age: 9.94 [range: 6–17] years). We examined the relationship between pupil metrics and SRS scores across groups via partial correlation, controlling for age, sex, and medication use.

Regression analyses were used for diagnostic prediction.
Results: Across all patient groups, SRS total and subscale scores were significantly correlated with pupil metrics ($P<0.041$ for all comparisons), indicating a linear relationship between ASD traits and pupil changes. Significant pupil metrics were entered into a regression model that included age, sex, and medication use as predictors of diagnostic group. Results identified minimum pupil constriction size, age, and medication status as significant predictors of ASD-ID group membership vs ASD and OND ($P<0.029$ for both comparisons). These results suggest potential diagnostic value of pupil metrics along with other patient-level variables, although data collection is ongoing. Future analyses with additional patients will aim to understand the role of ID and specific SRS subscale scores on the PLR.
Conclusion: Our results highlight the feasibility of using hand-held, FDA-approved pupillometer technology as a screening tool for neurodevelopmental differences in a real-world clinical setting. Differences in the PLR are related to quantitative measurements of ASD traits, and the PLR may be useful as an objective screening tool for children with neurodevelopmental concerns.

VIRTUAL DATA WAREHOUSE

Process Improvement Initiative to Improve User Documentation and Knowledge Content Website for Research Data Warehouse

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Background: The Institute for Health Research maintains a research data warehouse via a dedicated team to conduct quality checks, resolve data issues, ensure data are loaded correctly, and provide content expertise to users. A website is used to manage information for the team and end users. As the data warehouse has grown, an up-to-date platform was needed to improve the accessibility of documentation and content knowledge.
Methods: We used a Lean process improvement approach: 1) Define the goal — move to SharePoint Online platform to achieve a modern look, increased functionality, and improved ease of use; 2) Map the current process — all information on the old website (page, document, and link) was audited, catalogued, and assessed for relevancy; 3) Analyze for changes — user interviews were conducted for feedback on the current site; 4) Create a new process — a new SharePoint site layout was created; 5) Implement new process — the Virtual Data Warehouse (VDW) team migrated information from the old site to the new site and filled in missing information; 6) Feedback — a preliminary user survey was conducted; and 7) Monitor results — once implemented in January 2024, a more robust user survey will be conducted.
Results: A SharePoint communication hub was created with supporting pages that provide information about content, privacy considerations, access, and HCSRN and Center for Ethics and Social Responsibility affiliation. Content area pages provide high-level quick facts and detailed information geared toward analysts and programmers. Improved navigation and naming convention allow users to find what they need more easily. Frequently asked questions, concepts and definitions, and a content summary matrix were added for user convenience. Preliminary user survey results showed that users were positive about the layout, ease in finding information, and organization of the new site. Several suggestions from respondents were implemented. An automated access and tracking process was developed to routinely confirm the business need and monitor access to sensitive data for nonresearch users.
Conclusion: Following a process improvement methodology helped the VDW team successfully build a website for all end-user levels. Using a SharePoint communication hub provided an effective structure to organize information, documents, and links. Based on early feedback, we are confident that the new site will be used with confidence and trust and considered a dependable resource for users.

Understanding SAS Licensing and Distributed Code

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Background: The HCSRN Virtual Data Warehouse (VDW) allows distributed code to run at each site with minimal changes. SAS has been the main tool used for distributed programming because it provides a flexible interface to many databases with a consistent syntax. However, the SAS system is a collection of products that can be licensed, and SAS platforms can vary widely in capabilities based on which products are licensed and installed.
Methods: By running distributed code on 2 SAS platforms available at the Center for Health Research, we aimed to demonstrate the effects of varying SAS licenses and installations on distributed code. We compared results on an ETL server with minimal SAS products licensed and an analytic server where a wider variety of SAS products were available. The specific product license associated with an SAS procedure or other code could be found by consulting SAS documentation.
Results: We found that common coding practices may cause SAS errors on platforms that lack access to a wider variety of licensed SAS products. Fortunately, minor changes to distributed code can avoid errors caused by licensing differences without material sacrifice in output quality.
Conclusion: Multisite programmers can minimize the risk of SAS errors in distributed code by adopting coding practices that minimize the need for additional SAS licenses beyond Base SAS. We recommend VDW staff familiarize themselves with SAS licensing practices to understand the impact of SAS platform differences on the portability of SAS code.

A Brief History of (VDW) Time — What a Long, Productive Trip It's Been

Roy Pardee

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Background: As we celebrate the 30th anniversary of the HCSRN and the 20th anniversary of the Virtual Data Warehouse (VDW), it is appropriate to take stock of the progress we've made in facilitating data-driven health services research over the years. Seeing where we've been should help orient us to the present and allow us to chart a course for the future.
Methods: I have had the privilege of working with the founders of the VDW from almost its inception in the Cancer Research Network, made significant contributions to its architecture, and have seen it evolve over the past 20 years. This session will set that history out in broad strokes so we can appreciate just how far we have come.
Results: My hope and expectation is that a review of this history will be edifying to both the technical and scientific members of the HCSRN research community. I will discuss what I consider the founding principles of the VDW, note its strengths and weaknesses, and point out the obstacles we have overcome and those we have yet to surmount.
Conclusion: The HCSRN and VDW's longevity are testament to their usefulness. With a proper view of just where we've been, how far we've come, and how far there still is to go, I believe we can meet the challenges posed by data-based research in an increasingly competitive environment.

POSTER PRESENTATIONS

AGING

Evaluating Tools of Multimorbidity Associated With Health Care Outcomes Between Older White and Black Patients

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Background: Managing multimorbidity among older adults is challenging and resource intensive. Existing tools to measure multimorbidity may vary in predicting health care utilization. This study evaluated different multimorbidity measures and odds of inpatient (IP) and emergency department (ED) admissions. Also, racial disparities in the associations between multimorbidity and ED or IP admissions were assessed.
Methods: This cross-sectional exploratory analysis utilized data from the Saith Louis University-SSM Health virtual data warehouse (2018–2022). The sample included 365,022 patients ≥65 years old. Morbidity measures included Elixhauser's sum and index, Charlson's sum and index, Chronic Condition Warehouse (CCW) sum, and Gibert Frailty Index (GFI) using ICD-10 codes. Outcomes included IP and ED admissions. To determine the performance of each measure to discriminate between those with and without each outcome, areas under the curve (AUCs) and Brier scores were examined. After determining the most predictive comorbidity measure, fully adjusted logistic regression models including that measure, age, race, gender, smoking, and medication utilization were calculated overall and by race (White vs Black).
Results: Average age was 74.0 (±7.2) years, and the sample was 57.8% female, 88.1% White, and 8.2% Black; 42.4% had IP and 45.3% had ED admissions. Compared to White patients, Black patients had higher average scores on all morbidity measures and were more likely to have ED or IP admissions. The GFI was the best measure by AUC (discriminant validity; higher is better) and Brier score (accuracy; lower is better): AUC of 0.836 and Brier of 0.163 for IP; AUC of 0.802 and Brier of 0.185 for ED. Adjusted logistic regression models using the GFI showed a 10% increased odds of IP admissions with every unit increase in the GFI (odds ratio: 1.097, 95% CI: 1.095–1.098). For ED admissions, the GFI showed 9% increased odds (odds ratio: 1.088, 95% CI: 1.086–1.089). The association of the GFI and ED and IP admissions was similar in White and Black patients.
Conclusion: The GFI was the best measure to predict IP and ED admissions among older patients. Monitoring frailty may identify older patients with multimorbidity at risk for hospitalization. Future research is needed to determine what interventions reduce hospitalizations in this population.

Knee Osteoarthritis Prevalence in a Novel Cohort of Veterans

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Background: Osteoarthritis (OA) is a common and disabling diagnosis worldwide. Administrative datasets offer efficient means for studying this insidious condition. Veteran Health Affairs' (VHA) robust database of administrative data offers a valuable resource to study knee OA. This study presents the methods for creation and descriptive statistics for a cohort investigating prevalence of knee OA in the VHA.
Methods: This exploratory cross-sectional study utilized the VHA Corporate Data Warehouse (CDW) to investigate the prevalence of knee OA in this population. Included veterans were 45–80 years of age at their first outpatient visit at the VHA, between 2009 and 2020, with ≥2 VHA outpatient clinic visits in 2 separate years. Diagnosis of knee OA was determined via ICD-9/10 codes for knee OA. Demographic variables included age, sex, racial identity, marital status, U.S. census region, and insurance type. Adjusted analyses were conducted using logistic regression for odds of diagnosis of

knee OA among those with complete demographic data. All analyses were conducted using SAS 9.4. Institutional review board approval was obtained.
Results: The descriptive analysis included 6,248,765 patients, with mean age of 62.1 (±9.1) years. This sample was 78.6% White, 15.8% Black, 2.4% other racial identities, and 92.5% male. The cumulative prevalence of knee OA from 2009 to 2020 among this cohort was 24%. Adjusted analysis of complete cases included 5,873,579 individuals to examine odds of knee OA diagnosis based on descriptive demographic characteristics. Adjusted analysis demonstrated that older age, female gender, Black racial identity, married status, and location in the North Central and Southern VHA regions were associated with higher odds of knee OA diagnosis.
Conclusion: This cross-sectional exploratory study found a cumulative knee OA prevalence of 24% over the 12-year study period. This analysis confirms known associations between biologic sex and age, supporting the validity of this approach. Generalizability is limited due to the nature of the VHA population; however, many findings from the VHA have been replicated in civilian health systems.

Nurses' Role in Facilitating Earlier Detection of Cognitive Impairment in Primary Care

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Background: Early diagnosis of neurocognitive disorders is highly beneficial for patients and families, yet cognitive impairment (CI) and dementia are frequently underrecognized. Scalable health system strategies are essential to address gaps in timely, comprehensive diagnosis. We describe the contributions of nurses to facilitating earlier detection of CI as part of DetectCID, a large pragmatic trial.
Methods: In all, 13 Kaiser Permanente Southern California clinics are participating as intervention sites where primary care providers (PCPs) request a tablet-based brain health assessment (BHA) in response to memory concerns. The BHA includes 3 domains — memory, executive function, and language skills — a mood assessment (PHQ-9), and an informant survey. For those with a high likelihood of CI, registered nurses (RNs) who function as brain health specialists order lab tests and a head computed tomographic scan to rule out potentially treatable causes of CI. The RN completes their assessment, which includes a call with caregivers, and routes a summary guidance to PCPs. Following the PCP diagnosis disclosure, the RN engages the patient and family in near- and medium-term care planning.
Results: The study is being conducted in 2 waves, and the wave 1 clinics (n=6) have successfully integrated study procedures into their existing workflows. A total of 52 patients have enrolled, and the initial RN assessments have yielded the following recommendations to the PCPs: n=9 suggestive of dementia, n=9 suggestive of mild CI, and n=6 inconclusive due to identification of potentially treatable causes of CI. One patient with existing Parkinson's was referred to neurology for diagnostic disclosure. Two patient workups are incomplete due to patients' refusal to nominate a care partner for the functional assessment. A total of 25 patient assessments are in progress. Overall, 5 care plans have been completed by RNs after PCPs disclosed the new diagnosis with the patient and care partners.
Conclusion: This is the first large-scale trial to evaluate multiple practice-support components, including new tools coupled with the use of RNs in providing brain health care in the setting of overstretched primary care practices. The RNs provide value-added timely assessments of CI and individualized care plans that focus on the patients desired health outcomes and connections to community resources.

BEHAVIORAL HEALTH

Reduced Emergency Department Use Among Insured Individuals Receiving Extended-Release Buprenorphine in a Health System Setting

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Background: Opioid use disorder and opioid overdoses continue to be a public health concern in the United States. Extended-release buprenorphine (XR-Bup), a once-a-month subcutaneous injectable, has been associated with reduced opioid use and opioid-negative urine drug screens. Little is known about the use of XR-Bup in standard health system-based addiction care.
Methods: Individuals prescribed XR-Bup were identified in the Virtual Data Warehouse. Chart abstraction was conducted on all individuals receiving an order. Primary outcome was all-cause emergency department (ED) use 6 months prior to and 6 months following XR-Bup initiation. Secondary outcomes included reasons for not initiating XR-Bup and reasons for discontinuation (derived from chart review). Statistical comparison for primary outcome used nonparametric tests from related samples to account for correlation of proportions. This included McNemar's test for categorical data and Wilcoxon matched-pair tests for continuous data.
Results: Overall, 126 individuals of 152 with XR-Bup order received ≥1 injection. The majority receiving ≥1 injection were male, identified racially as White, and had multiple comorbid psychiatric diagnoses. Common reasons for not initiating XR-Bup included not showing for scheduled appointment (n=12) or choosing to remain on different opioid antagonist (eg, n=4 sublingual buprenorphine or methadone). Mean number of injections in 6 months following initiation was 3.95. Individuals using ED services for all causes declined following XR-Bup initiation (41% prior vs 28% after; $P<0.05$). Proportion of individuals requiring inpatient treatment for mental health- or substance use-related reasons declined following XR-Bup initiation (46% prior vs 16% after; $P<0.01$). Common reasons for not continuing with

XR-Bup included losing insurance coverage (21%) or cost of treatment (11%).
Conclusion: Use of XR-Bup in a health system setting was associated with reduced ED use 6 months following initiation. XR-Bup may help health systems reduce use of costly ED services.

Posttraumatic Stress Disorder Symptom Severity and Diabetes Outcomes in a Sample of Veterans With Comorbid PTSD and Type 2 Diabetes

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Background: Poor health behaviors are common in persons with posttraumatic stress disorder (PTSD). Prior research has shown PTSD vs no PTSD is associated with greater risk of type 2 diabetes (T2D), while PTSD symptom improvement is associated with a lower risk of T2D. However, it is unknown whether severity of symptoms and symptom type in comorbid PTSD/T2D are associated with T2D outcomes.
Methods: Veterans Health Affairs medical record data (2015–2022) were used to create a retrospective cohort of patients 18–80 years old with comorbid PTSD/T2D. Main exposures included PCL-5 symptom cluster (intrusion, avoidance, negative mood, hyperarousal) and severity of PCL-5 symptoms (mild: 0–32; moderate: 33–65; severe: 66–80). Outcomes were time to insulin initiation, time to any microvascular complication (diabetic nephropathy, retinopathy, or neuropathy), time to poor glycemic control (hemoglobin A1c of ≥7.5), and time to all-cause mortality. Follow-up time was months from index to either the outcome of interest, censoring, or death. Entropy-balanced-weighted competing risk survival models calculated hazard ratios (HR). Subgroup analyses were by age, race, and depression.
Results: Overall, the sample was 70.4% age range of 50–80 years, 64.2% White, 30.5% Black, and 88.0% male. Average PCL score was 48.7 (±16.4), with 17.1% having mild, 67.4% moderate, and 15.5% severe PTSD symptoms. After controlling for confounding, hyperarousal was associated with a lower risk of starting insulin (HR: 0.58, 95% CI: 0.43–0.80). Negative mood was associated with a greater risk of any microvascular complication (HR: 1.16 95% CI: 1.01–1.33), and both moderate (HR: 1.05, 95% CI: 1.01–1.11) and severe (HR: 1.15, 95% CI: 1.07–1.23) vs mild severity was associated with a greater risk of any microvascular complication. Patients 65–80 years of age with moderate vs mild PTSD had a lower risk of starting insulin, while patients 18–49 years of age with severe vs mild PTSD had an increased risk. Finally, severe vs mild PTSD was associated with lower all-cause mortality (HR: 0.76, 95% CI: 0.63–0.91).
Conclusion: There is preliminary evidence that PTSD severity and symptom type may be differentially related to T2D outcomes. Further research is needed on how to further define PTSD phenotypes based on symptom cluster and severity. Also, focused treatment based on PTSD phenotype may improve patient self-efficacy to make healthier lifestyle choices associated with diabetes management.

Differentiating Clinician Approaches to Opioid Risk Discussions for Patients With Opioid Use Disorder Using Archetypes Informed by Patient Perspectives

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Background: Primary care clinician (PCC) approaches to discussing opioids with patients who have opioid use disorder (OUD) vary and may be more effective when adapted to their patients' features. This study examines 1) the transferability of Hooker's 4 archetypes to patient populations in 2 HCSRN systems and differences between archetypes, 2) terminology preferences, and 3) risk perception.
Methods: Semi-structured interview data were collected from 40 patients (mean age: 50.5 [standard deviation: 13.6] years; 100% White; 67.5% female) who were diagnosed with OUD, taking a medication for OUD (MOUD), or who received >3 opioid prescriptions in the 12 months prior the study. Study participants were receiving primary care services from 15 clinics affiliated with 2 HCSRN health systems. Interviews explored patient views on discussing opioids, opioid risks, OUD, and MOUDs with their PCCs. The Rigor and Accelerated Data Reduction method was used to develop a codebook from the data, and the resulting codes were analyzed using an iterative inductive/deductive approach to identify and organize themes.
Results: Hooker et al's 4 archetypes (opioids used for chronic pain, acute use of opioids, problematic opioid use with openness to treatment, and problematic opioid use without openness to treatment) transferred well to the study sample, but 2 new archetypes were also identified: in recovery on an MOUD and in recovery not on an MOUD. Participants fitting Hooker et al's archetypes preferred "dependence" over "addiction" to describe opioid use clinically defined as OUD or high risk, and vice versa for those fitting recovery archetypes. The meaning of both terms varied among patients and often diverged from clinical definitions. Participant views on appropriateness of using the term in clinical settings varied. Differences were identified in opioid risk perception among participants who use opioids, either chronically or acutely.
Conclusion: Differences in opioid use risk perceptions among patients were detected within each nonrecovery archetype. Distinct OUD-terminology preferences between patients fitting in-recovery and nonrecovery archetypes also were found. More research is needed on how and when PCCs should use addiction and dependence terminology with patients, especially when patient and clinical definitions contrast.

Marijuana Use Documentation Within Electronic Health Records at an Integrated Delivery Network: A Cross-Sectional Study

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Background: Medical marijuana (MMJ) was legalized in Pennsylvania in 2016, yet understanding of the extent and location of capture of marijuana use within the electronic health record (EHR) remains limited. The purpose of this study was to understand the location of marijuana documentation within the EHR and the change in the proportion of patients with marijuana documentation in the EHR over 9.5 years at Geisinger.

Methods: We conducted a cross-sectional study to quantify marijuana use documentation within the EHR in patients with at least 1 clinical encounter from January 2013 to June 2022. We examined both discrete and free-text documentation. Discrete data included social history, laboratory results, medication orders, diagnostic codes associated with clinical encounters and the problem list, and a smart data element (SDE) developed in 2018 to document dispensed marijuana information. We searched text in encounter notes and social history comments for mention of marijuana use or related terms curated using natural language processing. We calculated the annual prevalence of marijuana use documentation within the EHR among patients with inpatient or outpatient encounters.

Results: We identified 182,743 of 1,762,548 patients (10.2%) with at least 1 documentation of marijuana use over 9.5 years. Free-text sources from EHR notes (n=150,726 [82.5%]) identified the highest number of patients, followed by social history (n=65,422 [35.8%]). In all, 13,427 patients (7.3%) were identified using only discrete data sources, while 58,589 (32%) patients had both discrete and free-text-based information about marijuana use. A total of 5699 (3.12%) of patients with documented marijuana use were identified as MMJ users from SDE and diagnosis codes associated with MMJ use. Documented marijuana use increased gradually over time, with the highest point prevalence of 9.1% observed in 2022. The greatest increase in the change in point prevalence was 24.1% (5.9% to 7.3%), observed in 2019.

Conclusion: Our results provide a foundation to understand the scope of marijuana use documentation within the EHR of a health system. Free-text capture of marijuana-related information creates a challenge for clinicians to accurately keep track of patients' use. System-level initiatives to enhance discrete capture of marijuana use will enhance a more complete understanding of patients' health and will support future research.

Characterizing Recruitment Outreach for a Chronic Noncancer Pain Study (RESOLVE)

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Background: Recruiting for studies of chronic noncancer pain (CNCP) can be challenging and labor-intensive. RESOLVE is a multisite study comparing the effectiveness of cognitive behavioral therapy telehealth approaches to improve health outcomes in those experiencing CNCP. This project characterizes study recruitment outreach efforts to a cohort of patient members within Kaiser Permanente Georgia.

Methods: From February 2021 to Februrary 2023, we invited approximately 700 potentially eligible patient members (≥18 years old, English-speaking, with specific CNCP ICD-10 codes) per month to participate in a year-long study. Study outreach strategies were chronological and included a mailed letter and brochure, followed by an email, and up to 3 phone calls. Phone call attempts were classified as "successful" if recruiting staff spoke to the intended patient member and as "other" if they spoke to anyone other than intended patient member, left voice messages, or received busy signals/no answer/etc. Characteristics were compared between enrolled and not enrolled patient members using chi-squared tests and 2-sample *t*-tests.

Results: Overall, we outreached to a large, diverse study cohort (N=16,601). Prior to recruitment phone calls, 53.2% of eligibility screeners were completed online, which generated 57% of all randomized study enrollees. A total of 14,893 patient members received phone calls. For every 100 calls made, recruiters spoke to 54 (48.9.%) patient members at least once and ultimately enrolled 609 (3.7%). The study averaged 94% of monthly target enrollment, and interested patient members took an average of 20 days to enroll. Patient members enrolled were mostly middle-aged, female, and non-Hispanic Black. Compared to those enrolled vs not enrolled, there were notable differences (P<0.0001) in the total number of successful and other phone call attempts. In addition, there were noted differences in age (P=0.008), gender (P<0.0001), and race (P=0.014).

Conclusion: Multiple modes of study outreach utilized for RESOLVE were structured to adequately engage patient members, even though it was labor-intensive outreaching to a

diverse cohort. Thus, the multimodal approach ensured success in surpassing overall target enrollment. Enrolled patient members, mostly middle-aged women, received more total phone calls (which included successful and other phone call attempts).

Member Participation in RESOLVE Study — A Large Pragmatic Clinical Trial for Noncancer Chronic Pain

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Background: Chronic noncancer pain (CNCP) lasting 90 days or more can diminish quality of life. RESOLVE is a randomized trial comparing the effectiveness of cognitive behavioral therapy telehealth approaches to improve health outcomes for those experiencing CNCP. This analysis characterizes patient members who screened and enrolled vs screened but did not enroll in RESOLVE at Kaiser Permanente Georgia.
Methods: Study outreached to about 700 eligible patient members (≥18 years of age, with specific ICD-10 codes for CNCP encounters) per month from February 2021 to February 2023 to participate in a year-long study. Outreach was done via mail, email, and phone in chronological order, and patient members could opt to complete the study enrollment process — screening, consent, and baseline assessment — via phone and/or using the study's online portal. We conducted descriptive statistics to characterize age, gender, race and ethnicity, pain types, and having at least 1 opioid prescription. Also, we compared screened and enrolled vs screened but did not enroll patient members using chi-squared and 2-sample *t*-tests, with significance alpha of $P<0.05$ for all statistical tests.
Results: Study screeners were completed by 12.8% of 16,601 patient members invited. Of those 2124 members, 839 screened eligible to participate in the study, 665 consented, and 609 enrolled. Members who screened and enrolled vs those screened but did not enroll were mostly non-Hispanic, female (79.0% vs 70.5%), Black (55.3% vs 58.6%), or White (36.3% vs 31.1%), with mean age of 57.3 (±12.6) years vs 56.6 (±13.4) years, respectively. Among members who screened and enrolled vs those not enrolled, 37.1% vs 26.8% had at least 1 opioid filled, and the top 3 pain types were limb/joint pain (24.7% vs 59.8%), back pain (17.6% vs 36.7%), and other painful conditions (12.9% vs 23.7%). Also, among comparison groups, there were significant differences ($P<0.05$) in gender, opioid fill, back pain, and other pain conditions, respectively.
Conclusion: We successfully invited and screened diverse patient members that were female, slightly older, and were non-Hispanic Black or non-HispanicWhite. More enrolled patient members had at least 1 opioid fill. However, patients who screened but did not enroll were significantly more likely to have back pain and other pain condition types. These study findings have implications for future recruitment efforts.

Do Lower Opioid Prescription Interventions Lead to Decreased Subsequent Opioid Use Among Postoperative Patients?

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Background: Excessive postoperative opioid prescribing had led to interventions that nudge surgeons to reduce opioid pill count. However, physicians' concern over more refill requests after reduction of opioid pills for postoperative patients has not been addressed. We analyzed cluster-randomized trial data and compared the subsequent opioid within 12 months after surgery between interventions and control.
Methods: A 12-month cluster-randomized control trial to compare effect of 2 norms versus control (usual care), respectively, on opioid prescribing behavior have been conducted for surgeons during 2020–2021. We extracted subsequent opioid order or refill all clinical settings for patients who had surgery from surgeons included in the trial in the 12 months before, during, and after trial. We compared likelihood of subsequent opioid use within 12 months after the surgery using Cox regression model. Patient-level characteristics, baseline opioid pill count prescribed, intervention arms, and 3 time periods were included in the model. Hazard ratios (HR) to compare the intervention arms to control at during-trial and post-trial periods were estimated.
Results: A total of 784 surgeons were included in the trial, and 18,686, 15,790, and 15,423 surgical procedures with opioid prescribed were conducted for surgeons in the guideline norm, peer comparison norm, and control arm, respectively, across all 3 time periods. Decreasing pattern of opioid refill or subsequent opioid prescription were observed from all 3 arms, from 29% to 19% in pre- to postperiod for guideline arm, 29% to 17% for peer comparison, and 23.4% to 13% for control arm. Cox model showed that the peer comparison arm was 16% more likely to have subsequent opioid compared to control in the trial period (HR: 1.16, 95% CI: 1.07–1.27) and increased (HR: 1.22, 95% CI: 1.09–1.35) in the post-trial time period. Similar but smaller amount of increase was found in the guideline arm in the trial period (HR: 1.08, 95% CI: 0.99–1.17) and post-trial period (HR: 1.16, 95% CI: 1.08–1.25).
Conclusion: Although two separate norm interventions have been shown to decrease the number of opioid pills prescribed at patient discharge, they were not effective in reducing subsequent opioid use at the patient level.

CHRONIC PHYSICAL ILLNESS

Cardiovascular-Related Medication Synchronization in Patients Living With HIV, Comorbidities, and Suboptimal Adherence: Challenges and Lessons Learned

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Background: As life expectancy increases in patients living with HIV (PWH), more chronic conditions are diagnosed and treated, thus increasing medication adherence challenges. Our goal was to assess a medication synchronization (med sync) program's ability to mitigate adherence challenges in PWH actively treated for type 2 diabetes mellitus (T2DM), hypertension, and/or hyperlipidemia.
Methods: We implemented a med sync process during 2022–2023. Pharmacy records were used to calculate the prior 12-month medication adherence for T2DM, hypertension, and hyperlipidemia medications in PWH using proportion of days covered (PDC). Eligible patients had a PDC of <80% overall or for any of the 3 comorbidities. Antiretroviral therapy (ART) was calculated but not included in the PDC eligibility calculation. After HIV provider approval, eligible participants were invited by telephone to participate in the med sync program. Those interested were then consented and enrolled. We report eligibility, baseline, and 6-month results of the med sync program and the ongoing challenges and lessons learned from this initiative in a post-COVID-19 environment.
Results: The eligible sample included 363 patients, with cumulative 12-month PDC of 69.58% (n=106) for T2DM, 69.56% (n=213) for hypertension, 64.72% (n=260) for hyperlipidemia, and 56.31% (n=363) for composite PDC (ie, T2DM, hypertension, and hyperlipidemia medications, collectively). Cumulative 12-month PDC for ART was 71.17% (n=363). All baseline characteristics and 6-month results for 6 enrolled patients will be reported. Implementation challenges included: 1) difficulty contacting suboptimally adherent patients; 2) passive provider endorsement; 3) perceptions of provider responsibility for non-ART therapy; 4) perceptions that adherence to one treatment projects to other treatments; 5) change in PDC between eligibility determination and enrollment impacting baseline PDC; and 6) limited recruitment success in virtual environments compared to in-person environments.
Conclusion: In PWH, multiple chronic conditions negatively impact disease-specific and composite medication adherence. Based on our experiences, innovative, collaborative, in-person strategies are essential to reach PWH in greatest need. Future work should focus on identifying and mitigating patient-, provider-, and health system-level barriers to programs that positively impact medication adherence.

Evaluation of the Impact of an Adult Medical Care Coordination Intervention on Patient Activation

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Background: Adult medical care coordination (AMCC) was implemented at Mayo Clinic to promote patient activation and reduce hospital readmissions. AMCC was adapted from the Coleman Care Transitions Intervention (CTI). RN Care Coordinators provided coaching to patients via 1 home visit and regular phone calls up to 6 months postdischarge. One objective was to evaluate impact of AMCC on patient activation.
Methods: This observational evaluation of patients in AMCC and usual care arms included adult patients after being discharged home who had LACE+ readmission risk score of ≥59, had ≥2 chronic conditions, and were paneled to 1 of 27 participating primary care practices. We measured activation with a 10-item Patient Activation Measure (PAM), a validated patient-reported outcome tool with 4 levels of self-activation ranging from level 1 (lower activation) to level 4 (higher activation). Measurement occurred at baseline and at 30, 90, and 180 days. We evaluated PAM as a binary (levels 1/2 vs 3/4) outcome using a linear probability model with fixed effects and as an ordinal outcome using an ordered logistic regression model with random effects.
Results: We identified 915 (432 AMCC, 483 usual care) patients who completed both the baseline and at least 1 follow-up PAM. Patients receiving AMCC were older (75.9 vs 66.4), had a higher LACE+ score (73.6 vs 71.0), and were more likely to have low activation at baseline (level 1/2: 50.0% vs 26.5%). For the binary analysis, AMCC was not associated with a significant change in the percentage of patients with a PAM level of 3/4 at 30 and 90 days but was associated with a significant increase in the percentage with a PAM level of 3/4 at 180 days (12.3 percentage points [95% CI: 4.0–20.5]). For the ordinal analysis, AMCC was associated with significant increases in the percentage with a PAM of level 3 (at 30 and 180 days) and a decrease in the percentage with a PAM of level 1 (at 180 days), but other differences were nonsignificant.
Conclusion: AMCC was associated with a significant increase in patient activation, with the improvement concentrated at the final measurement. Higher activation has been linked to better self-management skills and lower levels of avoidable health care utilization. Therefore, the observed improvement shows the value of AMCC as a coaching intervention to increase patients' confidence to self-manage their health.

DATA ANALYTIC METHODS

Estimating Underdiagnosis Using the Electronic Health Record: A Long COVID Case Study

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Background: Most electronic health record (EHR) research relies on diagnoses to identify patients with specific conditions. However, recorded diagnoses do not always reflect clinical prevalence, as they are influenced by variation in patient

presentation, clinician diagnostic processes, and subsequent EHR documentation. This issue is likely especially pronounced for subjective symptom-based diagnoses.

Methods: Our goal is to use Long COVID, a new symptom-based diagnosis of exclusion, to develop a framework to estimate underdiagnosis using information available in the EHR. As a first step, we will explore how Long COVID is documented at Advocate Health, a large health system with nearly 6 million patients. This will include diagnoses, symptom documentation, and referral patterns that may indicate the presence of Long COVID. We will assess variation both within and across patient records, evaluating the reliability of specific fields for research. Subsequently, we will operationalize an alternative way, beyond a formal Long COVID diagnosis, to identify patients with Long COVID and estimate the extent of underdiagnosis for this condition.

Results: Our process will shed light on the research impact of variation in diagnostic practices and EHR documentation. Long COVID is a salient example, as preliminary research suggests that many patients with Long COVID are not receiving a formal diagnosis in practice. However, few studies are attempting to quantify this underdiagnosis to better estimate the impact of Long COVID for patients, clinicians, and the health system. Given that Long COVID is estimated to affect at least 77 million individuals in the United States, our results will have direct relevance for health care planning. Further, by developing a method to validate subjective diagnoses using EHR documentation, we will be able to quantify potential disparities in diagnoses by patient-, provider-, and system-level factors.

Conclusion: The EHR has created an enormous opportunity to conduct research using data collected for health care purposes. However, EHR data have quickly become the default for many studies, without a deep understanding of the dataset's limitations within a research context. Our proposed methodology will provide a way to quantify some of these limitations to contextualize research findings based on EHR data.

Sex and Race/Ethnicity Variation in Worsening Heart Failure in Kaiser Permanente Southern California, 2014–2019

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Background: One in 6 adults with heart failure (HF) will have a worsening heart failure event (WHFE) within 18 months of their diagnosis, resulting in poor prognosis and high health care resource utilization. This study describes variation in WHFE by sex and race/ethnicity.

Methods: We identified all adults (≥18 years old) with a diagnosis of HF between 2014 and 2018 and followed them for WHFE through 2019, defined as hospitalizations with a diagnosis of HF and signs, symptoms, objective findings, and/or changes in therapy indicative of WHFE. Criteria were ascertained using a validated natural language processing algorithm incorporating structured electronic health record data and unstructured clinical notes. Characteristics of adults having and not having WHFE were compared. Rates of WHFE per 100 hospitalizations per year were calculated for subgroups by sex, race and ethnicity, and categories of baseline HF with preserved, mid-range, and reduced ejection fraction (HFpEF, HFmrEF, and HFrEF, respectively).

Results: Adults having WHFE compared with not having WHFE were more likely to be older (mean age: 75 vs 73 years; P<0.001), female (45% vs 44%; P=0.01), Black (16% vs 13%), and Hispanic (24% vs 22%). The proportion of adults with baseline HFpEF was also higher for those having vs not having WHFE (46% vs 39%; P<0.001). Rates of WHFE declined from 2014 to 2019 across subgroups (P<0.05 for all comparisons). By 2019, WHFE rates remained slightly higher among females compared with males, driven by those with baseline HFpEF (34.9 per 100 vs 33.4 per 100). In 2019, rates were higher among Black (35.7 per 100), Hispanic (34.9 per 100), and Asian/Pacific Islanders (34.8 per 100) compared to White adults (30.6 per 100) overall. Rates of WHFE were highest among Black individuals with HFrEF (37.7 per 100) compared to all other groups.

Conclusion: Despite declining rates of WHFE during the study period, disparities persisted by sociodemographics and HF type. Given a higher burden of WHFE in Black, Hispanic, and Asian/Pacific Islanders, prioritizing optimal HF treatment and management in these underserved populations is warranted.

A Hybrid Machine Learning and Natural Language Processing Model for Early Detection of Acute Coronary Syndrome

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Background: Acute coronary syndrome (ACS) is a leading cause of mortality and morbidity. The incorporation of machine learning models in risk stratification has the potential to support clinical decision-making, but the inclusion of free-text data can be challenging. This study explored machine learning models incorporating free-text clinical documentation to aid ACS evaluation.

Methods: This observational cohort study included patients evaluated for ACS within 9 emergency departments. We collected electronic health records comprised of structured data and free-text, unstructured clinical narratives from January 2017 to August 2020. We excluded patients without an electrocardiogram and troponin. The primary outcome was non-ST-segment elevation myocardial infarction (NSTEMI), unstable angina, or non-ACS etiologies. Feature selection modeling included BorutaShap and SelectFromModel methods for dimensionality reduction. An oversampling technique (SMOTE) was used to address data imbalance. We used an 80:20 train-test split to evaluate each model's performance

based on sensitivity, precision, and F1 score metrics.
Results: There were 16,096 patients with clinical concerns for ACS included in the study (eg, 173 NSTEMI vs 47 unstable angina vs 15,876 non-ACS etiologies). The median age of all patients was 62.0 years, with a first and third quartile of 53.0 and 71.0 years, respectively. Of the study patients, 45.1% were male and 85.1% were African American. There were 113 total features extracted for model construction, 6 from structured and 107 from unstructured data. Our proposed framework (ie, raw data + feature engineering + feature selection + SMOTE) outperformed the other model (ie, raw data + feature engineering + feature selection) in our analysis across all evaluation metrics. The proposed framework successfully classified these cohorts with accuracy, sensitivity, precision, F1 score, and areas under the curve of 94.3%, 94.3%, 94.3%, 94.3%, and 97.4%, respectively.
Conclusion: We combined unstructured and structured data to build a framework that will serve as a diagnostic support tool for preventing misdiagnoses among patients with clinical concerns for ACS. Our findings suggest that adding features from unstructured data to a richer data dimension enhances the performance of the proposed framework.

GENOMICS & PRECISION MEDICINE

Pharmacogenomics Knowledge and Perceptions Among Pharmacists Embedded in Medicare-Only Primary Care Clinics

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Background: Pharmacists have been long heralded as the clinician best equipped to integrate pharmacogenomics (PGx) into clinical practice. At Geisinger, PGx implementation is occurring within Medicare-only primary care clinics, where pharmacists order PGx testing and interpret results. To better understand pharmacists' knowledge and perceptions prior to PGx implementation, we conducted an anonymous survey.
Methods: The survey was developed and administered using REDCap to Geisinger pharmacists practicing at Medicare-only primary care clinics. While creating the survey, input was sought from research and pharmacy stakeholders. Where possible, previously published survey questions were utilized. The finalized survey included 28 questions broken into the following sections: demographics, previous PGx exposure, PGx knowledge, and PGx perceptions. Structure of the questions were Likert-scale and open-answer questions (which were optional for pharmacists to complete). An email was sent to eligible pharmacists, which invited them to complete the survey using a unique REDCap link. All pharmacists were consented, and survey answers were kept anonymous.
Results: In total, 8 pharmacists responded to the survey, including all eligible participants (100% completion rate). These pharmacists have been practicing for a mean of 8.8 years, and 7 (88%) identified as female. On a scale from 0 (strongly disagree) to 10 (strongly agree), pharmacists responded to the statement "I believe that pharmacogenomics testing is relevant to my current clinical practice," with a mean score of 6.6 (between "Somewhat Agree" and "Agree"). Using the same scale, "I believe my patients will benefit clinically (ie, fewer medication side effects and better efficacy) from pharmacogenomics testing," received a mean score of 6.9. Finally, "I have the training and professional development required to deliver pharmacogenomics testing and counseling," received a mean score of 3.8 (between "Disagree" and "Somewhat Disagree").
Conclusion: Pharmacists embedded in our Medicare-only primary care clinics appear to believe that PGx is relevant and will benefit patients, but aren't confident in their knowledge of PGx. Training materials and modalities were enhanced in response to the survey answers. For example, pharmacists were offered individual training sessions at request. A postimplementation survey of these pharmacists is planned.

HEALTH EQUITY

National Area Deprivation Index as a Predictor of Adherence to Bone Mineral Density Screening Among Patients With Newly Diagnosed Breast Cancer

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Background: Bone loss among breast cancer (BC) survivors is a common side effect of BC treatments. Clinical guidelines recommend bone mineral density (BMD) screening among patients with BC, yet adherence to screening is low. This study aimed to evaluate the impact of national area deprivation index (ADI), a national ranking of neighborhood sociodemographic disadvantage, on adherence to BMD screening.
Methods: Patients with newly diagnosed BC were retrospectively evaluated from January 2019 to January 2021. BMD screening (Yes/No) was defined by a completed dual x-ray absorptiometry scan order within 2 years of BC diagnosis. National ADI was distributed into quartiles (Q1 = least disadvantaged, Q4 = most disadvantaged). A multivariable logistic regression model evaluated the likelihood of not receiving BMD screening using ADI as the primary predictor while adjusting for potential confounders. A multivariable Cox proportional hazards model evaluated the association between ADI and time from diagnosis to first BMD screening.
Results: Among 3129 patients with newly diagnosed BC in 2019, 12% of them adhered to BMD screening guidelines. After adjusting for potential confounders, patients in Q2 (odds ratio [OR]: 1.53, 95% CI: 1.14–2.05), Q3 (OR: 1.76, 95% CI: 1.29–2.38), and the most disadvantaged Q4 (OR: 2.38, 95% CI: 1.71–3.30) were less likely to be screened compared to patients in Q1 (least disadvantaged). The median number of days from diagnosis to first BMD screening was 486 days (interquartile range: 246–620). In adjusted analysis, patients in Q2 (hazard ratio [HR]: 0.69, 95% CI: 0.53–0.90), Q3 (HR: 0.57, 95% CI: 0.43–0.76), and Q4 (HR: 0.43, 95% CI: 0.31–0.60) were

more likely to have a prolonged time to first BMD screening compared to Q1 patients.
Conclusion: Overall, adherence to BMD screening guidelines was low. ADI was a significant independent predictor of adherence to screening guidelines and time to first screening from diagnosis. New approaches to increase screening rates and improve coordination of care, with a focus on patients living in the most disadvantaged areas, are needed.

Inequitable Treatment Continued: Disparities in COVID-19 At-Home Treatment for Black Patients

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Background: The COVID-19 pandemic disproportionately impacted people of minority races and ethnicities in the United States. Health inequities were pervasive during the COVID-19 pandemic, evidenced by disparate COVID-19 cases, hospitalizations, and deaths. Despite the availability of COVID-19 at-home treatment (eg, Paxlovid), members of racial and ethnic minority groups continue to experience disparate pandemic effects.
Methods: In 2023, Sutter Health launched the Equitable Treatment Project — a 14-month quality impovement and evaluation project working with patients and clinicians to develop and implement tools to reduce disparities in at-home COVID-19 treatment for Black and Latinx patients. We analyzed prescribing data in ambulatory settings, from April 2022 to March 2023, among patients who had COVID-19 infection in the first year after the release of at-home COVID-19 treatment. Utilizing electronic health records, at-home COVID-19 prescribing data were extracted to assess sociodemographic differences in prescribing practices by race/ethnicity for adult patients. Descriptive analysis of prescribing rates and COVID-19 hospitalizations by race/ethnicity were calculated.
Results: For patients who had COVID-19 between October 2022 and September 2023 (n=142,175), fewer racial/ethnic minoritized patients were prescribed COVID-19 at-home treatment than non-Hispanic White patients. Black patients (30.9%) were less likely to be prescribed at-home COVID-19 medications compared to non-Hispanic White patients (45.9%; P<0.001). Non-Hispanic Black patients were more likely to meet the criteria for at-home COVID-19 treatment, including higher rates of chronic disease and lower COVID-19 vaccination rates (84% vs 91%; P<0.001), making them more susceptible to severe COVID-19. Non-Hispanic Black patients were also less likely to have at-home COVID-19 treatment prescriptions filled (22% vs 30%; P<0.001). Moreover, Black patients were more often hospitalized for COVID-19 (13%) than other racial/ethnic groups (2%–6%; P<0.001).
Conclusion: Non-Hispanic Black patients are less likely to receive preventive treatment for COVID-19. Inequitable access to treatment contributes to increased mortality for racial and ethnic minoritized people. Lessons learned from the COVID-19 pandemic should be applied in providing equitable care for Black patients in addressing racial inequities in health systems.

Using a Novel Community-Based Participatory Research Design to Investigate the Underdiagnosis of Long COVID Among Black Americans

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Background: Research shows health inequity continues to impact individuals from historically marginalized populations, which leads to distrust in the health system. However, community-based participatory research (CBPR) combats this inequity by empowering individuals from marginalized communities to collaborate with scientists and lead research that is important to their community.
Methods: The current study will employ a CBPR design to investigate the underdiagnosis of Long COVID among Black Americans using data collected from Advocate Health's electronic health records (EHR) system, Epic. The CBPR team consists of researchers from Advocate Health, community members with Long COVID who identify as Black or African American, and clinicians who have experience treating Long COVID patients. The whole team will meet monthly to guide each phase of the project (eg, develop research questions, discuss results, disseminate findings). Additionally, a leadership team, which is composed of 2 researchers from Advocate Health and 2 of the community members, will meet weekly to manage the project and plan the monthly meetings.
Results: The initial CBPR team meetings will aim to develop research questions that examine the prevalence of Long COVID among Black Americans and factors that may contribute to underdiagnosis. Using these questions, researchers from Advocate will analyze EHR data and present aggregated results to the CBPR team. Subsequent meetings will focus on interpreting the results and disseminating the findings. The success of CBPR relies on teammates utilizing their unique expertise to guide the study from start to finish. However, this is not to suggest teammates are only able to contribute to the project through the lens of one skillset or experience (eg, being a patient with Long COVID). CBPR embraces how an individual's varied experiences and identities intertwine to create a unique perspective that enhances the project in numerous ways.
Conclusion: CBPR fights disparity in health care research by giving individuals from historically underserved populations the ability to lead research within their own community. Results from this study will highlight how CBPR can enhance our ability to conduct culturally informed research, and we recommend scientists consider adopting the model for future studies.

Identifying Race, Ethnicity, and Culture Using Surveys: Opportunities for Improving Inclusivity in Research

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Background: Current measures that assess race and ethnicity are limited to 5 racial and 2 ethnic groups. These categories are often not representative of how individuals self-identify and overlook the nuances of race and ethnicity. This study aims to develop a comprehensive measure of race/ethnicity that is inclusive of diversity within racial and ethnic subgroups.
Methods: The ENSPIRE study employed a community-based participatory research approach to improving COVID-19 booster vaccination rates among long-term care staff (LTCS) in Georgia and Washington state. To accurately ascertain race and ethnicity among this sample, the team developed an inclusive measure of race/ethnicity by 1) evaluating current methods of race/ethnicity data collection; 2) reviewing data on representation of U.S. racial and ethnic minority groups; 3) supplementing with interview data from LTC administrators; and 4) piloting survey questions on race/ethnicity.
Results: The final survey utilized a single question in which respondents could check multiple options when identifying their race and ethnicity. A 13-option multiple choice survey question was developed to reflect race and ethnicity in Georgia and Washington state. Racial and ethnic subcategories were selected for the 7–10 most prevalent immigrant populations per continent. Within the 13 options, branching logic was incorporated to allow respondents to select specific cultural identities from 51 additional options. The baseline LTCS survey included a total of 1042 survey respondents from 40 long-term care communities. (Survey respondents' self-reported race and ethnicity will be presented in a table.)
Conclusion: We developed a survey to comprehensively categorize race/ethnicity among LTCS. While respondents selected many of the new categories, infrequently endorsed options may pose challenges when evaluating the association between race and ethnicity and study outcomes. Above all, providing comprehensive race/ethnicity options may increase representation and promote belonging and inclusivity in research.

Real-World Impact of Eliminating Race in the CKD-EPI Equation on Patients With Chronic Kidney Disease in Kaiser Permanente Mid-Atlantic States

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Background: Chronic kidney disease (CKD) is a leading cause of death in the United States. Until 2021, the CKD-EPI equation to calculate estimated glomerular filtration rate (eGFR) depended on race, which increased the threshold required for Black/African American and Unknown racial groups. Patients in these racial groups remained undiagnosed, even with equitable serum creatinine levels and similar age ranges and sex as patients in other racial groups diagnosed with CKD.
Methods: Kaiser Permanente Mid-Atlantic States maintains a CKD registry with both active and disenrolled members who are ≥18 years old and meet 1 of the following criteria: have an eGFR of <60 mL/min/1.73m^2 (stage 3 or higher) for more than 90 days that never returns to above 60 mL/min/1.73m^2, are on dialysis, and are transplant-eligible or received a transplant. In July 2022, the inclusion criterion was revised and the CKD-EPI equation with removal of racial dependence was implemented in the registry. The CKD-EPI equation, with and without the race component, was used to calculate eGFR. Frequency distributions of the two cohorts were compared and stratified by age, CKD stage at first CKD diagnosis, sex, self-reported race, and insurance type.
Results: Both precorrection and postcorrection cohorts were predominantly female (n=28,488 [52.8%] and n=38,169 [53.6%], respectively). Within the precorrection cohort (n=53,915), 21,133 members (39.2%) were Black/African American, which increased by 61.9% to 34,216 (48.1%) in the postcorrection cohort. There was a 32.1% increase in total patients captured in the CKD registry postcorrection. Of the 17,288 members added in the postcorrection cohort, 13,083 (75.7%) were Black/African American and 4205 (24.3%) were in the Unknown racial group. Median age among Black/African Americans decreased from 68.3 to 66.6 years in the postcorrection cohort. The new CKD-EPI equation resulted in 574 patients advancing from stage 3 to 4 and 130 patients from stage 4 to 5; 9978 active members were added to the registry postcorrection.
Conclusion: The modified CKD-EPI equation had a profound impact on the diagnosis of CKD in Black/African American and Unknown racial groups. The increase in patients with stage 3 CKD, the advancement of stage for a smaller number of patients, and a decrease in overall age at CKD onset suggests the impact of this change can lead to earlier interventions and potentially a better overall prognosis.

Examining Racial Disparities in the Centers for Disease Control and Prevention's Vaccination Composite Measure

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Background: Kaiser Permanente works to ensure all members are vaccinated; however, vaccination rates vary across race and ethnicity. Examining factors driving vaccination rate disparities enables targeted approaches for improving vaccination coverage.
Methods: We conducted a retrospective study using data spanning 2016–2020 at Kaiser Permanente Georgia (KPGA) and Kaiser Permanente Mid-Atlantic States (KPMAS). Immunization records from adults (≥19 years of age) were queried. A vaccine composite measure was constructed for 3 age groups based on Centers for Disease Control and Prevention (CDC) recommendations for flu, tetanus, pneumococcal, and shingles vaccinations. The Oaxaca-Blinder method was used to examine the relative effects of HBF factors contributing to vaccination rate variation between non-Hispanic White (NHW) and non-Hispanic Black (NHB) members.
Results: At KPMAS, on average, 26.5% of NHB and 39.0% of NHW adults were up to date. Vaccination rates at KPGA were similarly low, and up-to-date vaccination rates varied by age; adults 50–64 years old had the lowest vaccination rates due to low shingles vaccination rate. Oaxaca-Blinder results indicated differences in neighborhood deprivation index between NHW and NHB members explained the most variation in vaccination rate (range: 17.2%–28.3%). Age was an important factor for adults 50–64 years old (range: 13.7%–17.7 %). Active patient portal registration explained a small amount of variation (range: 3.2%-4.7%).
Conclusion: Most adults are not up to date with recommended vaccines. Racial disparities in vaccination rates are poorly explained by electronic health record-derived factors, which are mostly nonmodifiable. To decrease vaccination rate disparities, additional data are needed to identify modifiable factors addressable by health systems.

IMPLEMENTATION & HEALTH CARE DELIVERY SCIENCE

Rethinking Patient Satisfaction Survey Workflow at JWCH Downey

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Background: Patient satisfaction surveys are collected at JWCH Downey and aggregated with other clinic locations to gauge performance and inform allocation of funds. Interviews with clinic stakeholders highlighted survey collection as a key issue due to the timing of survey distribution and clinic workflow, the inadequacy of Spanish survey translations, and the inconsistency of survey completion.
Methods: Meetings with JWCH leadership, IT specialists, and clinic staff guided the feasibility of proposed interventions, and it was determined the first iteration should focus on process improvement (over survey rewording or automation). A new clinic workflow was drafted, and medical assistants (MAs) were trained to implement it, with supporting signage hung. Implementation occurred Q1 2023. Primary outcome measure was number of surveys collected. Two weeks after the workflow change was put in place, MAs were convened for initial process feedback. Number of surveys collected with new process were tracked.
Results: There was a 49.4% increase in the number of surveys collected during Q1 2023 (after the intervention) from the average number of surveys collected from the two quarters prior to workflow change. The information captured by the surveys was also more likely to be representative of the respective visit, as patients only have access to fill out the survey after the completion of the visit rather than before or during. While we addressed some components of survey administration improvement, there was additional need for refinement of survey verbiage for clarity and improvement of Spanish translations by native speakers, requiring Helath Resources and Services Administration guideline adherence and the corporate data team input.
Conclusion: Quality improvement work benefits from an iterative approach. In a multisite Federally Qualified Health Center system with central corporate leadership and data analysis, data collection process changes at one site may pose a challenge in downstream aggregation, preventing significant survey change without corporate approval. A multistep intervention allowed stepwise change.

Implementation of a Remote Blood Pressure Monitoring Program: Satisfaction, Strengths, and Further Opportunities for Improvement

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Background: Recently, a cohort of Kaiser Perrmanente Southern California patients with uncontrolled hypertension were enrolled in a remote blood pressure (BP) monitoring program, in which at-home BP cuffs were utilized that automatically uploaded home-reads to the patient's electronic health record (EHR). Patient adherence, satisfaction, and effect on control had yet to be evaluated.
Methods: Participants in this study were those identified as having uncontrolled hypertension at Kaiser Hollywood Romaine outpatient clinic. They were then provided with a BP monitor that connected to EHR system for remote monitoring. The primary intervention of this project was conducting phone interviews for participants enrolled in the study. Interviews were conducted by 8 individual researchers using standardized interview questions. The questions explored themes on ease of use of BP monitor, patient satisfaction, typical use of monitor, location preference for checking BP, and lifestyle changes. For analysis, we included those individuals who were identified as Black in the EHR system. We manually reviewed responses to identify qualitative themes.
Results: Of the patients enrolled in the study, 53.3% (16 of

30) checked BP at home at least 3 times a week; 13 patients were flagged as having controlled hypertension in the EHR, 17 uncontrolled, and 1 unknown. The vast majority of patients (90.3%, 28 of 31) felt that it was easy or near easy to check their BP, while 87.1% (27 of 31) found it easy or near easy to upload their BP. For patient satisfaction, 90.3% were very satisfied or satisfied with the remote BP monitoring program. One patient encapsulated the impact of the remote BP monitoring pilot program, sharing "I know what [my blood pressure] is now, and that is better than not knowing ... knowing what [my blood pressure is] is the motivator to make me go [exercise] … for me controlling my blood pressure is that walking in the mall.
Conclusion: Most patients (>77%) in our sampling group found the at-home BP monitoring program to be satisfactory, easy to participate in, and preferred checking at home over having their BP checked in clinic. Furthermore, the majority of patients (>60%) reported that the program helped them keep their BP in a healthy range and encouraged them to make healthy choices.

Suicide Risk Prediction Algorithms: A New Tool for Teen Suicide Prevention?

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Background: Teen suicide is an urgent public health crisis. Optimizing identification of risk in this population may enable improved prevention in health care settings where teens often seek care prior to attempt. Suicide risk prediction algorithms have potential to improve suicide care, but few studies have explored the perspectives of teens and their guardians about how this tool should be implemented.
Methods: Purposively sampled teens (13–17 years of age) and their guardians were identified using a suicide risk prediction algorithm validated for risk estimation in the 90 days following a mental health encounter. Identified dyads were recruited via emailed or mailed invitations, followed by telephone outreach to guardians. Participating teens and guardians were interviewed separately by phone. Semi-structured interviews elicited general perspectives and personal experiences with mental health care and, specifically, suicide risk identification tools (including risk prediction algorithms). All participants received a $100 gift card for participation. Audio-recorded interviews were transcribed and analyzed using a rapid group analysis process.
Results: A total of 20 interviews were conducted from June 23, 2023, to September 21, 2023. Teen participants (N=9) included 5 female, 2 male, and 2 nonbinary participants (2 Black, 2 Asian, 5 White). Guardian participants (N=11) included 9 female, 1 male, and 1 nonbinary participants (3 Asian, 9 White). All participants described positive perceptions of implementing risk identification algorithms to support improved suicide care for teens. Participants also expressed uncertainty about this reality, however, based on prior negative experiences seeking teen mental health care. Guardians described a lack of timely access care and the desire for improved bidirectional communication with teen mental health providers. Teen participants expressed the need for relationships with trusted providers who listened and tried to understand their perspectives.
Conclusion: Teens identified at high risk of suicide, using a previously validated algorithm, and their guardians expressed positive perceptions toward use of suicide risk prediction tools to support care. This group of interview participants also described negative experiences and barriers with access to timely and supportive teen mental health care. Interview findings will be used to inform implementation.

INFECTIOUS DISEASE

Determining the Association Between Residential Segregation and Paxlovid Prescription Orders and Fills Among Kaiser Permanente Georgia Adults With COVID-19 Infection

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Background: Paxlovid is a COVID-19 treatment shown to reduce risk of hospitalization and mortality when taken within 5 days of symptom onset. Prior studies suggest that disparities in Paxlovid treatment exist by race and in areas with high social vulnerability. We examined the association of racial residential segregation with access to Paxlovid among patients diagnosed with COVID-19.
Methods: We included KPGA adults (≥18 years of age) diagnosed with COVID-19 between January 2022 and September 2023 and who remained enrolled for a minimum of 30 days during their COVID-19 infection. The primary outcomes were a Paxlovid order and Paxlovid fill. The 2017–2021 American Community Survey and the racial Index of Concentration at the Extremes (ICE) was used as a measure of residential segregation at census tract level and categorized into tertiles: predominantly Black, mixed, or predominantly White neighborhoods. Multivariable logistic regression assessed the association between residential segregation and Paxlovid prescriptions orders and fills, adjusting for age, sex, and race.
Results: Among 45,326 patients (49% Black and 63% women) who had at least 1 COVID-19 diagnosis and available racial ICE data, 13% had a Paxlovid order and 11% had a prescription filled. Compared to adults diagnosed with COVID-19 and living in predominantly White neighborhoods, those living in predominantly Black neighborhoods were 9% (odds ratio [OR]: 1.09, 95% CI: 1.01, 1.17) more likely to have Paxlovid ordered. Adults living in mixed neighborhoods had a similar likelihood (OR: 1.03, 95% CI: 0.96, 1.11) of Paxlovid order as adults in predominately White neighborhoods. KPGA members living in mixed neighborhoods (OR: 0.86, 95% CI: 0.73, 1.01) and predominantly Black neighborhoods (OR: 0.78, 95% CI: 0.66, 0.92) were less likely to have Paxlovid filled when compared to individuals in predominantly White neighborhoods.
Conclusion: Adults diagnosed with COVID-19 and living in predominately Black neighborhoods were more likely to

have Paxlovid ordered, although they were less likely to fill their Paxlovid prescription. Additional analyses are needed to determine the challenges to accessing care for COVID-19. Care teams are encouraged to consider structural or contextual inequalities and challenges for members accessing care.

MATERNAL, CHILD, ADOLESCENT & FAMILY HEALTH

Evaluating the Accuracy of Infant Weight and Length Measurements From Electronic Health Records for Use in Maternal Vaccination Safety Studies

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Background: Insufficient growth during the first year of life following prenatal vaccine exposures has been identified as a potential concern. Electronic health records (EHR) provide a source of data for pharmacovigilance. However, weight and length measurements in the EHR occur at varying ages across infants and contain data errors.
Methods: Growth measurements were taken during primary care encounters for infants (0–12 months of age) at a health system that participated in the Mothers and Infants LinKed for Heathy Growth (MILk) study (2014–2017). We used weight and length measurements taken at 1-, 3- and 6-month MILk study visits as the reference standard. We assessed the accuracy of data from the primary care encounter nearest in time to the MILk study visit after implausible values were removed. Also, we assessed the accuracy of predicted values generated from EHR measurements at the time of the study visit of interest using a generalized additive model with cubic spline and autoregressive correlation structure. Paired *t*-tests were used to evaluate absolute differences.
Results: The study comprised 209 infants with 1864 growth measurements. After implausible values from EHR were removed, 1205 measurements were retained. There were 27 measurements identified within 7 days of the 1-month study visit, 8 measurements within 14 days of the 3-month visit, and 167 measurements within 14 days of the 6-month visit. Subtracting study visit from EHR measurements, weight difference in kg ranged from 0.003 (95% CI: -0.02, 0.02) at the 6-month visit to 0.06 (95% CI: -0.07, 0.19) at the 3-month visit, and length difference in cm ranged from 0.54 (95% CI: -0.001, 1.08) at the 1-month visit to 0.81 (95% CI: 0.56, 1.05) at the 6-month visit. Using predicted values, weight and length values were available for 207 infants. Weight and length differences were in the same range as the differences from the nearest measurements.
Conclusion: After removing implausible values, differences in infant weight and length measurements from EHR and research data around 1 and 6 months of age were minimal. Predicted values from EHR can estimate weight and length measurements at specific ages for evaluating infant growth patterns in pharmacovigilance research.

A Qualitative Study of Experiences of Mixed-Modality Prenatal and Postnatal Care Among Leaders, Providers, and Birthing People During Early COVID-19

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Background: Much research on telehealth prenatal and postnatal care during COVID-19 has been quantitative/survey-based, has only examined provider or patient perspectives, and/or has focused only on prenatal care. This study aimed to understand the experiences of birthing people, providers, and leaders with the mixture of telehealth and in-person prenatal/postnatal care.
Methods: We conducted a qualitative study among birthing people, providers, and organizational leaders experiencing, implementing or managing prenatal/postnatal care across Sutter Health, a large Northern California health care network. Interviews were conducted over the phone or Zoom. Transcripts were analyzed in Dedoose using codebook thematic analysis. The codebook included enabling factors, challenges, benefits, and drawbacks of implementing mixed-modality care across the 3 groups. The team examined key insights within coded text segments, grouped insights based on relationships and patterns, and created themes through engagement with both segments of text and the overall dataset.
Results: We conducted 65 interviews with leaders (n=8), providers (n=7), and birthing people (n=50). Enabling factors were appropriate training/equipment and the importance of ensuring that patients are knowledgeable about and encouraged to make the choice between in-person and telehealth care. Challenges were telehealth not providing the reassurance/connection that both providers and birthing people craved and the uncertainty about how best to juggle preferences for telehealth or in-person care. Benefits were removal of logistical challenges for patients and flexibility of scheduling in-person and virtual visits. Drawbacks were logistical and technological frustrations of telehealth, birthing people and leaders missing the comfort and reassurance that came with being seen in-person, and feeling that something may be missed without a physical examination.
Conclusion: Telehealth options for prenatal and postnatal care have remained beyond the pandemic. The distinct experiences of leaders, providers, and birthing people offer insights into the ways in which telehealth can be successfully integrated and the drawbacks that come with telehealth and mixed-modality care.

RESEARCH SUPPORT

Supporting Physician Research: A Scientific Writer Role Within a Large Integrated Health System

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Background: The Mid-Atlantic Permanente Medical Group (MAPMG) is comprised of more than 1600 physicians, with multiple opportunities for engaging in physician-driven research. MAPMG employs a scientific writer to assist physicians with various aspects of abstract and manuscript development and publication.
Methods: The scientific writer position is part of the Mid-Atlantic Permanente Research Institute within MAPMG and primarily assists physicians within MAPMG's Physician Research Scholars Program, a funded program for frontline physician research. The scientific writer is available to assist with editing, formatting, and writing both conference abstracts and manuscripts as part of research conducted by Scholars Program and MAPMG physicians at large. This role also involves assisting with conference poster development, grant writing, and any other research-related writing needs.
Results: In the first year of support, the scientific writer assisted in the development of 5 posters, 4 conference abstracts, and 17 manuscripts. Additionally, the scientific writer co-authored 2 manuscripts. The role was also adapted to be a first point of contact for physicians expressing an interest in research activities.
Conclusion: The scientific writer has become an integral position within the Physician Research Scholars Program support team. As physician research grows at MAPMG, the role of the scientific writer will continue to expand and adapt to meet new needs, characteristic of learning health systems.

SHIFT TO TELEHEALTH VISITS

Evaluating the Impact of COVID-19 Pandemic on In-Person vs Telehealth Visit Among Patients With Mental Health Conditions

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Background: The COVID-19 pandemic accelerated health system transition to telehealth due to concerns about transmission risk. However, it is still unclear to what extent individuals with mental health conditions utilized telehealth versus in-person visits during the pre-, peri-, and postpandemic periods.
Methods: This study included 1,333,966 patients with mental health diagnoses from 3 health systems within the Mental Health Research Network. Weekly numbers of visits were calculated for in-person and virtual encounters, respectively. Time series data were collected from January 1, 2019, to December 31, 2022, and were modeled using segmented regression analysis. Each segment of the time series was estimated by a linear regression line defined by an intercept and a trend (slope), representing the rate of change in numbers of visits. To assess the impact of the COVID-19 pandemic, changes in visit trends in each segment were examined through the end of 2022, with the optimal number of breakpoints selected by using Bayesian information criterion (BIC).
Results: On average, the number of weekly in-person office visits increased from January 1, 2019, to March 7, 2020 (slope β: 493; $P<0.05$). There was then a sharp decrease observed from 244,607 visits/week on March 8, 2020, to 143,923 visits/week on March 21, 2020 (β: -100680; $P<0.05$), followed by a gradual rise from March 22, 2020, to September 12, 2020 (β: 5625; $P<0.05$). The number of in-person visits remained relatively constant from September 13, 2020, to October 17, 2021, and slowly declined to 160,247 visits/week at the end of 2022. In contrast, there was a significant surge in the number of telehealth visits from March 8, 2020, to April 4, 2020 (β: 12885; $P<0.05$), followed by a slight decrease from April 5, 2020, to August 15, 2021 (β: -288; $P<0.05$), and there was a slight decrease until the end of 2022 (β: -25, not statistically significant).
Conclusion: The COVID-19 pandemic triggered a rapid shift from in-person visits to telehealth visits. The number of in-person visits did not fully return to the baseline level by the end of 2022. However, after a rapid increase in March 2020, telehealth visits remained about 10 times the baseline level through the end of 2022, indicating that the appeal of telehealth persisted after the pandemic waned.

SOCIAL DETERMINANTS OF HEALTH

Patient Portal Engagement and Impact on Blood Pressure Control

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Background: Patient portals (PP) linked to electronic health records (EHR) are increasingly used for patient-provider communication and to introduce interventions aimed at improving blood pressure (BP) control. It is not clear how engagement with a PP impacts blood pressure control, especially in primary care settings serving disadvantaged patient populations.
Methods: This is a retrospective cohort analysis of EHR linked with PP log-file data from a large, diverse, integrated health system in the Midwest. Patients with uncontrolled hypertension (systolic BP of >140 and/or diastolic BP of >90) in 2022 who have BP readings 1 year apart were included. The first visit was

considered the baseline visit. Patient engagement with the PP is defined as accessing PP within 7 days of at least 50% of primary care provider visits. We will use multivariate logistic regression models presented as odds ratios and 95% confidence intervals to evaluate associations between PP engagement and reaching BP control at 1 year. Interaction between PP engagement and race/ethnicity also will be explored.
Results: While the analysis is not yet complete, a total of 20,464 patients had uncontrolled BP (>140/90) at baseline. Most patients were under 75 years old (80.7%), non-Hispanic White (62.6%), used Medicare insurance (50.8%), and English speakers (95.5%). We anticipate that patients engaged with the PP are more likely to have controlled BP at 1 year compared to patients with less frequent use.
Conclusion: PP adoption and continuous engagement can play a large role in managing chronic diseases, specifically hypertension. Health systems should focus on implementing interventions to increase PP adoption and continuous engagement while simultaneously targeting disadvantaged populations to prevent an exacerbation of disparities.

Implementation Success of Interventions Addressing Social Needs in Primary Care: A Systematic Review Using the RE-AIM/PRISM Framework

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Background: Identifying and addressing social needs in the clinical setting leads to improved health outcomes and lower costs, yet there is little guidance on how to implement social needs screening and interventions in primary care. The objective of this systematic review was to better understand the implementation success of social needs screening and intervention in primary care.
Methods: We searched CINAHL, Cochrane, Ovid, PubMed, and Scopus from January 2015 to August 2023. Relevant articles were divided among 2-reviewer dyads for title and abstract screening and full-text review. Studies were included if they described interventions, programs, or quality improvement initiatives that screened for and addressed social needs in a primary care setting and reported implementation outcomes and/or contextual determinants under the Reach, Effectiveness, Adoption, Implementation, Maintenance (RE-AIM)/Practical, Robust, Implementation, and Sustainability Model (PRISM) framework. We will extract characteristics of the studies, intervention data, and components of each of the dimensions in the RE-AIM/PRISM framework.
Results: We identified 35 studies (45 articles) for inclusion. We will use the RE-AIM/PRISM framework to guide our understanding of the contextual determinants affecting implementation success and outcomes. We plan to report the comprehensiveness of reporting within RE-AIM domain to identify gaps in the literature and successful strategies for social needs screening and intervention. Studies will be assessed narratively (and quantitatively, as feasible) across each implementation outcome (eg, reach, adoption) and what contextual factors impacted implementation success (eg, how did patient characteristics play a role in facilitating or inhibiting implementation, how did the organizational characteristics or infrastructure impact implementation). Key facilitators and barriers will also be summarized.
Conclusion: We expect to summarize the implementation outcomes and contextual factors affecting implementation success to understand how and under what conditions interventions addressing social needs can be successful. We expect the findings from this systematic review to help inform and improve the development, testing, and implementation of processes to address social needs in large health systems.

Adapting Self-Measured Blood Pressure Monitoring Among Underserved Communities (ASPIRE): Program Evaluation and Customer Discovery

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Background: Self-measured blood pressure (SMBP) monitoring is an effective strategy to control blood pressure. However, adoption remains low, especially among disadvantaged patient populations. We utilize costumer discovery to understand stakeholders' preferences, needs, and problems to inform the development of a toolkit to support patients with uncontrolled blood pressure in taking SMBP readings at home.
Methods: Customer discovery interviews were conducted with primary care providers, patients, and health system leadership from Advocate Health primary care sites serving disadvantaged patient populations. Interview guides were developed, and interviewees were recruited using snowball sampling methods. Sequential interviews were conducted until reaching thematic saturation. Interviews lasted for 20 minutes, and detailed notes were taken and documented in a notes template created a priori for these interviews. Interviews were analyzed using rapid qualitative analysis methods that were applied by 2 raters. This included creating a matrix, testing, and finalizing its components, coding the interviews using the matrix, and summarizing emerging themes.
Results: A total of 28 interviews were conducted with stakeholders, including 5 health system leaders, 11 hypertensive patients, and 12 primary care providers attending primary care sites on Chicago's south side. During the interviews, primary care providers reflected on the challenges of receiving SMBP readings from their patients. Patients described barriers to taking and sharing SMBP readings with the care team. Six themes emerged from the interviews, including lack of access to blood pressure devices, lack of training on using the devices, inconsistence guidance on how to report the readings, variability in preferences on how to share the readings, inconsistent workflows, and lack of support staff dedicated for SMBP monitoring.
Conclusion: SMBP monitoring is complex, and barriers exist at

multiple levels. There is a need for a toolkit that addresses these barriers at the patient, provider, and health system levels. The Adapting Self-Measured Blood Pressure Monitoring Among Underserved Communities (ASPIRE) toolkit will be developed to address the concerns raised by stakeholders during this customer discovery exercise.

Social Connectedness Experiences of Mothers During the Postpartum Period in Nepal

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Background: Social connectedness, a concept that aims to capture the subjective psychological bond that someone feels in relation to others, is important during the postpartum period. One way to intervene during the postpartum period is through an examination of what makes people feel socially connected. This study explores this concept of social connection among mothers in their postpartum period in Nepal.
Methods: We examined this research through the Sensing Technologies for Maternal Depression Treatment in Low-Resource Settings study, which focuses on the testing of an integration of digital technologies for psychological treatments delivered by nonspecialists. One objective of this study is to understand mothers' experiences during the postpartum period so that nonspecialists can provide more nuanced psychological interventions. A total of 7 focus-group discussions and 12 key informant interviews were conducted. Informants included mothers, their partners, counselors, and nurses. A conceptual framework of social connectedness was examined: Closeness, Identity and common bond, Valued relationships, Involvement, and Cared for and accepted (CIVIC).
Results: Within cultures in Nepal, there is a gap in preparedness by women and their support system in terms of the birth, postpartum period, child-rearing, and changes in family dynamics. While certain domains of social connectedness are salient, such as sharing a common bond with others who have undergone a Cesarean delivery as well as instrumental forms of support such as feeding the infant, further emphasis should be placed on women's emotional feelings of connectedness during the postpartum period. To cultivate emotional connectedness, mothers should take time to do what makes them feel like themselves through self-care, which includes activities alone or with others, and communicate their needs with those they are closest with during this critical period.
Conclusion: Women during the postpartum period juggle different responsibilities related to being a mother, wife, daughter-in-law, professional, and/or other identities. Findings illustrate a need for more preparedness through counseling and training among mothers and their support system during the perinatal and postpartum periods on how to foster emotional connectedness and promote mental well-being.

Unveiling Behavioral Beliefs: Anthrax Vaccine Knowledge and Uptake Among Emergency Responders in St. Louis, Missouri

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Background: Emergency responders are crucial to the continuity of operations of our health system. The primary aim to vaccinate health care workers is to prevent the transmission and spread of vaccine preventable diseases (VPD) within the health system. There is limited research related to emergency personnel immunization status to anthrax vaccination uptake.
Methods: We conducted a survey among emergency responders (N=376) in Saint Louis, Missouri, period between December 2014 and July 2015. Descriptive statistics and factor analyses were conducted based on sociodemographic and 5 behavioral belief factors (personal barriers to receiving the vaccine, reasons for receiving vaccine, postexposure vaccination, information and adverse reaction to vaccine, and vaccine series) to explore factors related to vaccination uptake. Also, the means of each factors were compared per intention to receive the anthrax vaccine using ANOVA and post hoc analyses.
Results: Only 36 emergency responders were offered the anthrax vaccine. Reasons for receiving vaccine (factor 2) had the highest between-categories mean of planning to receive the anthrax vaccine as soon as being feasible, and this was followed by the mean of information and adverse reaction to vaccine. On the other hand, personal barriers (factor 1) had the lowest between-category means of planning to receive the anthrax vaccine as soon as being feasible. Furthermore, emergency responders are more likely to take the vaccine when by significant others, coworkers, and supervisors.
Conclusion: Emergency responders in our study are willing to take the anthrax vaccine once it is offered to them. This highlights the opportunity to provide the anthrax vaccine at the workplace. Lastly, targeted interventions must be developed to address barriers related to anthrax vaccination uptake among emergency responders.

Anthrax Awareness and Vaccination Knowledge Among Emergency Personnel in the St. Louis Metropolitan Area

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Background: Health care workers are a crucial part of our health system. Their protection against infectious disease outbreaks or bioterrorism-related events are essential to ensure

the continuity of health care services. However, very little is known about health care workers' knowledge related to anthrax and anthrax vaccination.
Methods: We conducted a survey among emergency responders (N=376) in Saint Louis, Missouri, for the period between December 2014 and July 2015. Descriptive statistics were conducted based on sociodemographic factors and knowledge about anthrax and the anthrax vaccine.
Results: Only 10% of the participants were offered the anthrax vaccine. Out of 18 questions checking the knowledge of anthrax and the anthrax vaccine, the mean correct answer was 15.77 (±0.96). Most of the participants were male, married, had college education, worked in law enforcement/security, worked in small or medium-size cities, and spend around 25% of their time in disaster-preparedness duties. There were no significant differences in the mean knowledge of the respondents and their willingness to be vaccinated for anthrax.
Conclusion: This study provides an insight into the limitations of anthrax and anthrax vaccination knowledge among emergency personnel in the Saint Louis metropolitan area. Further research is needed to identify strategies to improve anthrax knowledge and anthrax vaccination uptake.

Examining the Association of Social Needs With Diabetes Mellitus Outcomes Among an Older Population

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Background: Previous research suggests social needs significantly contribute to poor health outcomes and mortality. However, less is known about how social needs relate to diabetes mellitus (DM)-specific outcomes. This study examined the association of social needs with DM-related outcomes.
Methods: This observational study included 1954 Kaiser Permanente Northwest members (≥65 years of age) with DM who completed the Medicare Total Health Assessment (MTHA) between August 17, 2020, and January 31, 2022. The MTHA assessed the following binary social needs (yes/no): 1) financial strain, 2) food insecurity, 3) housing instability, 4) social isolation, and 5) transportation needs. Dichotomous outcome measures (yes/no) included good glycemic control (hemoglobin A1c of <8%), any DM-related emergency department (ED) utilization and any DM-related hospitalization measured 12 months after MTHA completion. Multivariable logistic regression assessed the association between number of social needs (0 vs 1, 2, and 3+ needs) and outcome measures, adjusting for patient characteristics.
Results: More social needs were associated with poorer glycemic control and higher DM-related ED utilization. Specifically, compared to those with no needs, those with 3+ needs (odds ratio [OR]: 0.40, 95% CI: 0.21–0.77) were less likely to have good glycemic control; while those with 1 need (OR: 1.53, 95% CI: 1.19–1.97), 2 needs (OR: 2.12, 95% CI: 1.40–3.21) and 3+ needs (OR: 2.29, 95% CI: 1.31–3.99) were more likely to have higher DM-related ED utilization. No significant associations were found between number of social needs and DM-specific hospitalization.
Conclusion: Findings suggest social needs are associated with poor glycemic control and higher ED utilization. Future research is needed to understand whether addressing social needs in the health care setting may improve glycemic control and reduce future ED utilization.

STUDY DESIGN

Evaluating Recruitment Strategies for a Longitudinal Cohort Recruitment Across 4 Geographically Diverse Integrated Health Systems

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Background: Successful recruitment strategies for observational studies differ over time and by demographic factors. Recent advances open opportunities for digital recruitment, though all demographic groups may not be equally responsive. The Connect for Cancer Prevention Study has a defined catchment population and a FAIR recruitment infrastructure, making it an ideal setting for recruitment science.
Methods: In partnership with the National Cancer Institute and 6 other health systems, 4 Kaiser Permanente (KP) regions — Colorado (KPCO), Georgia (KPGA), Hawaii (KPHI), and Northwest (KPNW) — began recruitment in 2022. KP members 40–65 years old with no history of invasive cancer are eligible and were recruited initially through mailed brochures, followed by email and texts. We piloted alternatives to this approach: 1) phone calls at KPGA for members who had received 1+ outreach by mail or electronic; 2) in-clinic recruitment at KPGA and KPHI; and 3) a noninferiority study of only email and text versus a mailed brochure at all KP regions. Consent ratios were calculated overall and by region, age, sex, and race/ethnicity.
Results: Among >30,000 KPGA members who could receive a recruitment phone call, consent ratio among 8746 with an attempted phone call was 2% compared to 5% with confirmed contact with KPGA staff. Of the 250 and 581 individuals approached in-clinic at KPGA and KPHI, respectively, 12.8%

and 12.2% consented. Among those recruited at KPGA, 41% were male and 75% Black, compared to 26.2% male and 38.7% Black active recruits. Among those recruited at KPHI, 31% were male, 45% Asian, and 27% Native Hawaiian or Other Pacific Islander (NHPI), compared to 28.3% male, 30.0% Asian, and 4.4% NHPI overall. In the pilot replacing the mailed brochure with an email, the consent ratio without the brochure (2.5%) was no worse than with it (2.9%; risk difference: -0.004, 90% CI: -0.007–0.001). Results differed by region, but not by age, sex, or race/ethnicity.
Conclusion: Consent ratios are higher when personal outreach (phone calls and in-clinic) is used, especially among specific geographic and demographic groups. Mailing brochures of study information does not appear to improve recruitment. Connect for Cancer Prevention continues to test alternative approaches to identify proven strategies for recruiting a diverse study population.

Development and Validation of an HPV Vaccine Hesitancy Tool for Adults in the United States: A Step Toward Addressing Public Health and Preventative

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Background: Human papillomavirus (HPV) is recognized as a common sexually transmitted infection in the United States, with high-risk types leading to the development of cancer. Yet vaccination rates have been suboptimal. To date there is no gold standard instrument to measure HPV vaccine hesitancy in adults. Therefore, the purpose of this study is to develop and validate an HPV vaccine hesitancy tool for U.S. adults.
Methods: For HPV vaccine hesitancy, items were developed after a comprehensive review of the literature. The Health Belief Model and SAGE Working Group framework was utilized to develop the instrument. In all, 11 subject matter experts (SMEs) from various health care and clinical research fields were invited to participate and provide their feedback. The SMEs performed a content validity index (CVI) by evaluating each item per level of relevancy measuring HPV vaccine hesitancy via Qualtrics. The CVI was calculated for the relevancy of the 38 items. The item-level CVI (I-CVI) was calculated for each survey item, and the scale-level CVI (S-CVI) was calculated for the overall survey tool.
Results: The I-CVI Scores ranged from 0.36 to 0.91. Items that scored above 0.8 were deemed excellent and were kept. Items scored between 0.7 and 0.79 were listed for revision and discussed with the team. Items that scored below 0.7 were removed from the final scale. Results for S-CVI and the final survey items for the scale are forthcoming.
Conclusion: HPV vaccine hesitancy is both an ongoing public health and preventive health care issue. The next phase of this study will be to implement a pilot test in the general population to identify key factors associated with HPV vaccine hesitancy among the population.

TECHNOLOGY, DIGITAL HEALTH, DECISION-SUPPORT TOOLS

Telehealth Readiness Among Patient Portal Users in Community-Based Health Centers

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Background: Digital health technologies have transformed health care by enabling access to care away from the clinic. Community-based health centers (CBHCs) serve patients who experience many access barriers and a high prevalence of chronic conditions. While digital health technologies can improve chronic disease outcomes, their delayed adoption in CBHCs and similar settings may exacerbate health disparities.
Methods: As part of a larger study on digital health technology adoption in CBHCs, we assessed patients' readiness to engage in digital health care. Four CBHCs provided information about remote patient monitoring and telehealth readiness. From November 2022 to December 2023, all ≥18-year-old patients at participating health centers who had access to their patient portal received a survey invitation through that portal. The survey was offered in English or Spanish. Patients received up to 1 additional reminder to complete the survey. Patients provided consent by participating in and completing the survey. Responses were collected through the patient portal. Those who did not return a survey were considered nonresponders.
Results: The survey response rate was 4.8% (485 of 10,161). Compared to nonrespondents, respondents were significantly older (mean age: 51 vs 44; $P<0.001$), more often English speakers (82% vs 71%; $P<0.001$), less often Hispanic (24% vs 40%; $P<0.001$), and more likely to have hypertension (32% vs 20%; $P<0.001$). Respondents reported using the patient portal frequently (47% used it 10+ times in the past year). Nearly all (96%) reported having access to a smartphone. Most accessed the internet at home through a cellular data plan (86%) or broadband (66%). Most never or rarely limited internet use due to cost (73%) or connectivity problems (74%). Many sought health information online (83%) or used technology to track progress on a health goal (66%), and 40% shared information from a tracking device with a health professional in the past year.
Conclusion: This study of patient portal users found high rates of chronic disease and social risks, few barriers to internet use, and high adoption of digital health technologies for information seeking, tracking, and communication. Our response rate limits generalization, but we suggest that patient readiness is not a major barrier to digital health adoption for chronic disease management in this setting.

Content Analysis of Marijuana-Related Discussions Through Patient Portal Messages

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Background: Patient portal messages allow patients to describe behaviors not otherwise captured in standard electronic health record (EHR) documentation. Little is known about how marijuana is discussed on this platform and if frequency or context changes over time. We aimed to estimate the prevalence of messages discussing marijuana and contextualize these discussions.
Methods: Among 15,340 patients from 2012 to 2022, we examined 206,699 MyChart patient portal messages within a 2-year period preceding and following identification of marijuana use as determined from a comprehensive EHR analysis. We used an unsupervised natural language processing approach to construct a lexicon that flagged messages explicitly discussing marijuana. Flagged messages were organized into 2 groups based on the year a message was sent to coincide with the opening of the first medical marijuana dispensary in Pennsylvania. Using a 10% random sample of messages from each group, we conducted a qualitative content analysis to understand the medical reasons behind patients' use and the overall purpose of the marijuana-related discussion.
Results: We identified 1782 messages sent by 1098 patients (14.0% of study population) as explicitly discussing marijuana. Of these messages, 97 (5.4%) were sent from 2012 to 2017, and 1685 (94.6%) were sent from 2018 to 2022. The most common medical reasons for use stated in sampled messages included pain (29.5% of messages), anxiety (13.7%), and sleep (11.1%). We identified 17 broad purposes for patients bringing up marijuana as a discussion topic. Primary purposes included patients requesting assistance in accessing medical marijuana (30.0% of messages), patients explaining the circumstances for their current marijuana use or non-use (28.4%), patients seeking guidance related to marijuana use (19.0%), and patients describing how they plan to use marijuana (9.0%).
Conclusion: Patients were increasingly more willing to discuss marijuana over patient portal messages and expressed interest in use for medical purposes after 2018. Insight into marijuana-related discussions through patient portal messages can help health systems determine opportunities to improve care around patients' marijuana use and inform patients on areas of potential misuse.

Differences in Prescribed Medications and Follow-Up Health Care Use Among Primary Care Patients With In-Person, Video, and Phone Visits

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Background: As telemedicine becomes a standard modality for health care, little is known about how the use of telemedicine (video and phone/audio-only) may differentially impact downstream health care use. This study examines whether the mode of primary care visit (in-person, video, or phone) is associated with prescribed medication and follow-up health care use.
Methods: This is a retrospective cohort study of adult primary care patients with visits in 2021–2022 in a large Midwestern health system. Main outcomes were receipt of prescription medication (overall and antibiotics) and follow-up health care visits (primary care, emergency department [ED], inpatient hospital) within 30 days of the primary care encounter. We randomly selected 1 encounter per patient per year for analysis. We used logistic generalized estimating equations to examine the association of visit mode (in-person, video, phone) and outcomes of interest, adjusting for age, race, ethnicity, state, insurance, language preference, comorbidities, neighborhood characteristics, and number of primary care visits in the analytic period.
Results: We included 1,252,203 patients with a primary care visit during 2021–2022. Of the 2,022,486 randomly selected visits, 96.2% were in-person and 3.8% were virtual (telemedicine: 83.1% video, 16.9% phone). After adjustment, compared to patients with in-person visits, patients with phone visits were less likely to receive a prescription while those with video visits were more likely to receive a prescription; those with video visits and phone visits were both more likely to be prescribed antibiotics. Patients with phone visits were more likely to have a follow-up primary care visit and ED visit, while patients with video visits were more likely to have an ED visit and less likely to have an inpatient hospital visit. Updated analyses will use multilevel mixed models to estimate the associations between visit mode and the main outcomes.
Conclusion: Among adult patients with primary care visits, visit modality differentially impacted prescribed medication and downstream health care use within 30 days. Future analyses will need to determine how patient, clinical, and physician characteristics impact the treatment patients receive and whether they need follow-up care.

Implementing Tableau Cloud at Kaiser Permanente Northwest's Center for Health Research

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Background: As key stakeholders in health care research demand more real-time access to data, Kaiser Permanente Northwest's Center for Health Research (CHR) decided to acquire an industry-leading product, Tableau, as a major visualization and analytical tool. CHR's final choice, Tableau Cloud, is unlike most server-based resources used at CHR, so CHR aimed to become more knowledgeable on how to best utilize and effectively manage this new tool.
Methods: Concerns with data and systems security for Tableau

Cloud are like those for all on-premises analytic software. We involved Kaiser Permanente's Technology Risk Office (TRO) from the outset to evaluate the security risks. We needed to demonstrate the access to the data and visualizations had robust and reliable security and that any data posted to the Cloud is itself secure and nonidentifiable.
Results: Many of the most difficult parts of the implementation — hardware, cloud functionality, access, and security — are delivered by a trusted entity with a SAS-70 compliant data center. Login security is at or above industry standard. Discussions regarding security of CHR data concentrated on what is transferred and actually residing on the Cloud and can it be compromised. A few elements work in our favor: Source data for Tableau packages reside behind CHR's firewall; the data informing Tableau packages involves SAS processing and desktop software to create highly curated summary datasets designed for the specific needs of that locally created Tableau package; transfer of the package and data to the Cloud is highly encrypted; these summary data published to the cloud are packaged in a Tableau hyper file format, making exposure improbable.
Conclusion: Tableau Cloud has been approved for use at CHR by the TRO and implemented. One initial project-specific instance with 18 users (12 internal, 6 external) has been joined by a CHR-wide instance for use by all projects wishing to present Tableau-rendered data to both internal and external stakeholders.

Clinician Perceptions on Predictive Risk Scores and the Use of MARKER-HF

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Background: The MARKER-HF (Machine learning Assessment of RisK and EaRly mortality in Heart Failure) model predicts 1-year mortality across a range of heart failure (HF) types. Information on how to use it in clinical practice is still lacking. We sought to understand: 1) clinicians' familiarity with and perceptions of using predictive risk scores, and 2) how MARKER-HF can be used in clinical practice.
Methods: We conducted 30-minute semi-structured qualitative interviews with primary care physicians (PCPs) and cardiology specialists across Sutter Health between May 11 and September 14. We explored their perception of using existing risk score predictive models in their practice and their considerations on perceived barriers and facilitators when they encounter a new predictive model, like MARKER-HF. In-depth interviews were conducted in English over the phone or via Zoom. Transcripts were analyzed in Dedoose using codebook thematic analysis.
Results: We conducted 16 interviews with PCPs (n=7) and specialists (n=9). All clinicians were familiar with predictive risk scores and utilized them to varying degrees. To facilitate adoption and utilization of a new risk score, clinicians emphasized the importance of establishing trust in it by understanding 1) its validity, and 2) what clinical actions to take as a result of the score. Both PCPs and specialists stated that the MARKER-HF score would have more utility in primary care to identify patients with HF who may ordinarily be overlooked using other variables. Overall, clinicians were in favor of implementing MARKER-HF, citing reasons including an appreciation of having a "hard number" to show patients when discussing prognoses to support patient education, which may promote patient engagement in clinical decision-making.
Conclusion: Use of risk scores is common in clinical practice, with perceived validity being key to their adoption. MARKER-HF is considered to have utility in the primary care setting for identifying patients with HF and for engaging patients. Effectively and efficiently identifying patients living with HF by way of primary care may reduce the cost burden of treatment and severity of the disease.

Robust Accrual of Adults With Diabetes to Support Weight Management in Primary Care

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Background: Despite steady increases in obesity prevalence, adults with obesity and type 2 diabetes mellitus encounter barriers to adopting effective surgical and pharmaceutical treatments. Providing real-time clinical decision support (CDS) could help overcome barriers and encourage discussions of weight loss strategies. We developed a CDS system that facilitated unexpected accrual rates.
Methods: The study is a cluster-randomized trial of 38 primary care clinics randomized to either a web-based, electronic health record-integrated CDS tool or to usual care. Web-based algorithms minimize selection by universally and consistently assessing study eligibility at all visits in study clinics for entire intervention period. All patients with a study-eligible visit are monitored over 18 months for follow-up visits, when they automatically accrue into the ITT population. Printing rates are monitored, as they are the best proxy for determining that the intervention was delivered to eligible patients as intended, yielding documentation that the CDS content was printed or opened at some time during the visit.
Results: Through the first 7 months of the 12-month accrual period, N=50,168 patients and N=88,361 visits have been assessed for eligibility, and N=11,506 patients had a study-eligible visit. Anticipated accrual for the entire 12-month accrual period was expected to be around 10,120. This is significantly higher than the expected accrual. Among those with at least 3 months of follow-up, n=4694 (111% of expected accrual) also had at least 1 follow-up visit. The CDS content was printed at 83.2% of eligible intervention clinic visits, indicating successful delivery of CDS content to eligible patients.
Conclusion: This study employed a universal systematic assessment approach for identifying eligibility for receiving a CDS designed to improve discussions around weight loss

options for adults with type 2 diabetes and obesity. Actual accrual is significantly higher than projected accrual. An automated approach could be implemented for other conditions/diseases to achieve optimal accrual rates.

Self-Reported Survey Results About Experience of Virtual Reality Headset on Reducing Anxiety in Pediatric Urgent Care Clinic

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Background: Urgent care pediatric patients may experience anxiety and stress, especially those coming in with pain or injury. The Take-Pause virtual reality (VR) program, an evidence-based stress reduction tool given through a VR headset, has been implemented by Palo Alto Medical Foundation (PAMF) pediatric urgent care clinic (PUCC) clinicians to potentially reduce anxiety.
Methods: Surveys were collected from parents/caregivers about their and their child's experience with the headset between January 2023 and November 2023. Descriptive statistics were used to summarize the survey data. We also conducted a paired *t*-test to compare the difference in mean value of anxiety score before and after the use of VR headset.
Results: From 141 survey respondents, the mean age of children using the headset was 11 years (range: 0–17 years). Overall, 68.7% of parents either agreed or strongly agreed that the VR headset helped their child and 89.3% agreed or strongly agreed that the headset was easy to use. About 88% reported that their child was "mostly" or "definitely" seen by a care provider in a timely manner. On a scale from 0 to 10, with 0 being "no anxiety at all" to 10 being "extremely anxious," the average anxiety score decreased from before and after using the headset (3.7 vs 2.0; $P<0.001$). On average, parents indicated that they would recommend the headset (mean score: 7.5 [standard deviation: 2.4]) and the practice (mean score: 7.4 [2.5]). Furthermore, parents positively rated their child's overall experience (mean score: 7.6 [1.7]).
Conclusion: Overall, parents/caregivers reported favorably toward utilizing the VR headset in pediatric urgent care. The expansion for using VR headset at all PAMF PUCC locations is underway as well as offering it at a new ambulatory care center before pediatric procedures.

VIRTUAL DATA WAREHOUSE

Alternatives to SAS: Using Python With the Virtual Data Warehouse

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Background: In the 30-year history of the Health Care Services Research Network (HCSRN), SAS has been the backbone technology and programming language; however, support for open-source technology has grown considerably at the same time. We are investigating the use of Python as a programming language to analyze data stored in the Virtual Data Warehouse as an alternative option to the use of SAS.
Methods: As a proof of concept, exploring Python requires an initial assessment of the functionality of SAS. To assess results, defined capabilities noted as required will be turned into unit tests. Unlike SAS, Python is purely a programming language, which requires open-source packages to fill in automatically included SAS capabilities. Once complete, a matrix of capabilities by SAS or Python will be shared to demonstrate viability on individual unit tests. The assessment also will include a scan of the current data technologies environment and lessons learned.
Results: The project is still in progress and we expect to demonstrate more capabilities at the HCSRN Conference. Preliminary results demonstrate 8 capabilities that are frequently used in SAS. In the coming months, we will expand the repository to touch on data from multiple sources.
Conclusion: While it is unlikely that transitioning from SAS is in the near future, advances in Python look promising for future analyst use.

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