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LATE-BREAKING ABSTRACTS

ADDITION SCIENCE/SUBSTANCE USE

Patient Experience of an Intervention Addressing Opioid Use in Primary Care

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Background: Opioid use disorder (OUD) affects 2%–4% of the U.S. population, with approximately half undiagnosed. Having primary care clinicians (PCCs) screen for OUD and discuss opioid risks with patients may improve access to treatment. This study aimed to learn about the patient experience when discussing opioids.

Methods: Patients with high risk for OUD and a visit with a HealthPartners PCC during a 9-month period were invited to participate. In all, 127 patients (mean age: 48.5 years, standard deviation: 14.7; 88% White; 52% female) completed surveys to understand the patient experience of an intervention to increase screening and treatment of OUD, which included a handout encouraging them to discuss opioids with their PCC.

Results: Overall, 54% (n=67) preferred to talk with their PCC rather than specialists about opioids and OUD treatment. Less than half (n=55; 44%) recalled having a conversation about opioids at a recent visit with their PCC. Of those who recalled having a conversation, 86% (n=47) felt the conversation was sensitively conducted. Only 25% (n=32) recalled receiving a handout, but 78% (n=25) of those reported that it was helpful.

Conclusion: Patients were generally open to discussing opioid use and potential risks with their PCC. A majority of those who received a handout felt that it made them more comfortable discussing opioids with their PCC. However, only one-quarter of patients recalled receiving the handout, so more effective ways of distributing the handout are needed.

AGING

Utilization of Multidisciplinary Services Before and After Diagnosis of Dementia With Lewy Bodies

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Background: Dementia with Lewy bodies (DLB) is a complex disease, and patients may benefit from multidisciplinary care; however, utilization patterns are largely unknown.

Methods: We examined electronic health record and claims data from HealthPartners between October 2015 and June 2022. We identified 175 patient-members with DLB, 2478 with Alzheimer’s disease, and 513 with vascular dementia based on ICD-10 codes. Random chart audits were conducted to confirm diagnosis. Multidisciplinary care was defined as physical therapy (PT), occupational therapy (OT), medication therapy management (MTM), neuropsychological testing (NPT), or medical nutrition therapy (MNT). Mixed-effects logistic models were used to model odds of each type of care pre-post index.

Results: Patients with DLB were more likely to have 2 or more types of multidisciplinary care compared to Alzheimer’s disease and vascular dementia groups. After adjustment for covariates, patients with DLB had greater odds of NPT, PT, and MNT than the other dementias. Patients with Alzheimer’s were less likely to utilize PT post-index than patients with DLB. A similar pattern was identified for OT in the vascular dementia group. There was no difference in odds of MTM and MNT pre-post index after adjusting for dementia subtype and other covariates. Non-White and multimorbid patients were more likely to receive MTM regardless of dementia subtype.

Conclusion: Patients with DLB were more likely to receive
multidisciplinary care than patients with Alzheimer’s disease or vascular dementia. Future research should explore whether these services impact rates of hospitalization or adverse outcomes.

**CHRONIC CONDITIONS**

**Cost-Effectiveness of Telephone-Delivered Blended Collaborative Care for Patients With Heart Failure and Comorbid Depression**

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**Background:** Depression is comorbid in 20%–25% of patients with heart failure and often goes unrecognized. We earlier demonstrated “blended” collaborative care (BCC) for treating depression and heart failure improves quality of life and reduces mood symptoms compared to usual care. Aims: We now report incremental cost-effectiveness of these interventions.

**Methods:** From March 2014 to October 2017 we enrolled 629 hospitalized patients with heart failure who screened positive for depression and who had mood symptoms after hospitalization (PHQ-9 of ≥10), then randomized them to nurse-provided BCC, collaborative care for heart failure (HFCC), or usual care. We obtained claims data from Medicare and health insurers on 503 (80%). We applied 2016 Medicare prices to claims and estimated intervention costs. We used generalized linear model with gamma distribution and log link to correct for skewness in cost data. We calculated the incremental cost per quality-adjusted life-year (QALY) among those with complete data at 12 months (N=358) from the payer perspective.

**Results:** Included patients were similar to those excluded due to incomplete data. BCC, HFCC, and usual care arms had similar mean costs of $285,499, $306,727, and $322,359, respectively, even after adjusting for gender, hospital type, and prior claims. Rehospitalization costs accounted for most expenditures. Incremental cost-effectiveness per QALY was -$798,276 (95% CI: -$31.8M to +$5.0M) for BCC vs usual care and -$1.9M (95% CI: -$55.5M to +5M) for BCC vs HFCC.

**Conclusion:** Blended collaborative care for heart failure and depression is likely cost-effective at generally accepted thresholds.

**Individualized Pediatrician Coaching Improves Motivational Interviewing for Pediatric Weight Management: Pragmatic Trial Preliminary Data**

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**Background:** Motivational interviewing (MI) effectively improves pediatric body weight management. Yet, limited data on pediatricians’ MI skill and effective delivery exist. This study aimed to evaluate pediatricians’ MI competence in pediatric weight management pre-post individualized MI coaching.

**Methods:** We enrolled pediatricians (N=212) in a pragmatic trial, Wellness Coaching for Kids, across Kaiser Permanente Southern California clinics. Preliminary pre-post data for pediatricians (n=38 [17%]) who completed two 4-hour MI coaching sessions and two 20-minute individualized virtual coaching sessions that included standardized patient encounter (SPE) scoring are reported. Using OnePass, an MI competence-validated tool, two MI trainers scored each pediatrician separately. All sessions were recorded and transcribed, and data were analyzed for interrater reliability.

**Results:** Pediatricians were mostly females (79%) and had completed 377 weight management referrals for eligible kids. The average SPE score out of 7 was 5.2 on the pretest vs 3.8 on the posttest. Qualitative data revealed perceived MI skill, insufficient patient history, and limited staff support as barriers, while self-confidence and patient-engagement were motivators to MI delivery.

**Conclusion:** Individualized MI coaching may improve MI skills and pediatric referrals for weight management. Further research on facilitators and barriers to MI, MI skill retention, and long-term impact on weight management in the pediatric population is recommended.

**Motivational Enhancement for Health Behavior Change Using Motivational Interviewing in Adults With Chronic Kidney Disease, Stage 3–5**

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**Background:** Adult patients with chronic kidney disease (CKD) are empowered to address barriers to optimal blood pressure with motivational interviewing (MI)-based health coaching. Research shows MI promotes patient autonomy and increases engagement in health care and lifestyle modification. Herein, we describe a health coaching intervention to support health behavior change.

**Methods:** Registered dietitians provide motivational feedback in 4 to 6 telephonic coaching sessions to enrolled participants diagnosed with CKD (stages 3–5). Each call focuses on 1 of 4 health behaviors shown to affect blood pressure values: dietary sodium, body weight, physical activity, and medication adherence. Between calls, tailored SMS and access to educational resources promote goal adherence. Registered dietitians practice MI skills with their own health goals; 10% of calls are scored with the validated OnePass.
Results: This study revealed clinical and individual opportunities to better support patients’ ability to improve outcomes. Many patients lack knowledge about their CKD diagnosis or how to improve blood pressure values, inhibiting motivation to change. Our intervention fills this gap by giving participants access to health coaching to discuss barriers, increase motivations, and set achievable goals.

Conclusion: Our health coaching and online electronic coaching interface supports participant autonomy, increasing goal adherence. Our multimodal intervention supports and motivates participants to improve health behaviors. Next steps will assess impact on clinical measures.

Mental Health

A Distinction Without a Difference? A Multimethod Approach to Understanding Posttraumatic Stress Disorder and Depression Symptom Overlap Among Disaster-Exposed Adolescents

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Background: Among adolescents exposed to disasters, posttraumatic stress disorder (PTSD) and depression commonly co-occur. Despite the prevalence of comorbidity, the question of how PTSD and depression are related remains unclear. The goal of this study was to examine the comorbidity between PTSD and depression symptoms among 2001 disaster-exposed adolescents.

Methods: To examine the comorbidity between PTSD and depression, we used confirmatory factor analyses (CFA) to assess whether they represent separate constructs, latent class analysis (LCA) to assess whether the overlap stems from varying symptom manifestations among different adolescent groups, and network analysis to assess whether individual symptoms form closely connected clusters by diagnoses.

Results: The CFA suggested that the PTSD and depression factors are indistinct from each other. The LCA identified 4 groups of adolescents who varied by symptom severity and not a diagnostic category. Last, symptoms did not cluster together by diagnostic category, highlighting the fuzziness between diagnostic boundaries.

Conclusion: Results do not fully support previous conceptualizations of comorbidity as the manifestation of two distinct disorders. Not only do results from this study have implications for understanding how disaster-exposed adolescent symptoms manifest but also have implications for improving behavioral health screening and delivering targeted patient-centered behavioral health interventions.

ORAL PRESENTATIONS

Addiction Science/Substance Use

Development, Implementation, and Evaluation of a Medication Health Center to Promote Opioid Safety

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Background: Given ongoing concerns about the risk of opioid overdose among people taking chronic opioid therapy for pain, Kaiser Permanente Colorado (KPCO) sought to develop a standardized approach to promote opioid safety.

Methods: To accomplish this, KPCO operational leaders partnered with researchers at KPCO’s Institute for Health Research with funding from KPCO’s Innovative Methods

Understanding the Intersection of Race/Ethnicity and Depression Screening in Integrated Health Systems

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Results: 14 clinics have been randomized to the order of intensive patient outreach and clinic staff education (7 to the early intervention and 7 to the delayed intervention arm). Since the first Medication Health Center opened, 1849 patients have attended a Medication Health Center, and 36.5% of patients who had a visit have been dispensed naloxone compared with 12.8% of patients prescribed chronic opioid therapy without a visit.

Conclusion: Future research will compare clinic attendance, naloxone uptake, urine drug screens, opioid dose, and overdose across the randomized arms.

Opioid Dose Reductions and Overdose Risk: A Multisite Cohort Study

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Background: Tapering long-term opioid therapy is an increasingly common practice, yet rapid opioid dose reductions may increase the risk of overdose. Our objective was to conduct a retrospective cohort study to compare overdose risk following opioid dose reduction rates of ≤10%, 11% to 20%, 21% to 30%, and >30% per month to stable dosing.

Methods: In 3 health systems (Kaiser Permanente Colorado, Denver Health, and Marshfield Clinic Health System), 5 opioid dosing patterns and drug overdoses were identified using electronic health records, pharmacy records, and National Death Index. Cox proportional hazard regression analyses were conducted on a propensity score-weighted cohort to estimate adjusted hazard ratios for follow-up periods of 1, 3, 6, 9, and 12 months after a dose reduction.

Results: There were 18,641 patients who received long-term opioid therapy in the cohort. Relative to stable dosing, a dose reduction rate of >30% was associated with an increased risk of overdose and the hazard estimates decreased as the follow-up increased. Adjusted hazard ratios for the 1-month, 6-month, and 12-month follow-ups were 5.18 (95% CI: 1.93 to 13.87), 1.79 (95% CI: 1.07 to 3.00), and 1.48 (95% CI: 0.97 to 2.25), respectively.

Conclusion: Patients receiving long-term opioid therapy exposed to dose reduction rates of >30% per month had increased overdose risk relative to patients exposed to stable dosing. Results support the use of slow-dose reductions to minimize the risk of overdose.

Proposed Conceptual Framework for the Study of Opioid Use, Chronic Use, Misuse, and Opioid Use Disorder: The Opioid Use Continuum

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Background: Use of opioid medications to treat chronic noncancer pain (CNCP) has increased in the last two decades. Increased opioid prescribing has been accompanied by a well-documented parallel increase in opioid misuse and diagnosis of opioid use disorder. Moreover, the concurrent increase in accidental overdose suggests a relationship between use, misuse, and morbidity.

Methods: A literature review was conducted and expert opinion sought to characterize the current state of research and clinical use of opioids as well as the characterization of opioid use, chronic use, misuse, and abuse. Additionally, factors associated with intensification of opioid use (ie, chronic use) or development of troubling use characteristics were identified.

Results: The resulting framework consists of a spectrum of opioid use classifications varying from opioid use, chronic use, misuse, and opioid use disorders. Over time multiple factors contribute to the risk of moving from acute use to opioid use disorder. However, it is not clear which factors have the greatest impact on this phenomenon nor what factors may be protective.

Conclusion: This framework is intended to serve as a starting point for researchers and clinicians to bring together the disparate factors that influence development of opioid use disorder in patients following the initiation of prescription opioids.

Dual Prescription Stimulant and Opioid Use and Risk for Opioid Use Disorder

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Background: Concurrent prescribing of stimulants with opioid analgesics is increasing in the United States. Stimulant medication use is associated with increased risk for long-term opioid therapy (LTOT), which is a risk for opioid use disorder (OUD). We determined if stimulant prescriptions among those with LTOT (ie, ≥90 days) were associated with greater risk for OUD.
Methods: A nationally distributed medical record and medical claims dataset (2008–2018) containing patients ≥18 years of age and free of prevalent OUD in the 2 years prior to index were eligible. All patients had a new ≥90-day opioid prescription. The index date was day 91. We compared risk for new OUD diagnoses in patients with and without a prescription stimulant overlapping LTOT. Entropy balancing and weighting controlled for confounding.

Results: Patients (n=5712) were 57.7 (standard deviation: 14.9) years old on average, 59.8% female, and 73.3% White race. Among those with LTOT, 2.8% had overlapping stimulant prescriptions. Before controlling for confounding, dual stimulant-opioid prescriptions, compared to opioid-only, were associated with OUD risk (hazard ratio: 1.75; 95% CI: 1.17 to 2.61). After controlling for confounding, this association was absent (hazard ratio: 0.89; 95% CI: 0.47 to 1.71).

Conclusion: Dual stimulant use among patients with LTOT does not increase risk for OUD. Stimulants prescribed for attention-deficit/hyperactivity disorder and other conditions may not worsen opioid outcomes among patients receiving LTOT.

Frequencies of Opioid Use Disorder Identification Using a Predictive Model in Primary Care

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Background: Opioid use disorder (OUD) prevalence is estimated at 2%–4%, with approximately half undiagnosed. Screening may improve identification, and the use of cognitive computing models to predict risk for OUD (CCM-OUD) is a novel way to limit screening to only those at highest risk. We report OUD screening results following implementation of CCM-OUD.

Methods: We conducted a clinic-randomized trial across 96 primary care clinics within 3 HCSRN sites. A CCM-OUD developed by Epic Systems Corp. was implemented. In intervention clinics (n=50), adult patients identified as high risk by the CCM-OUD prompted an alert advising administration of a ≥2-question OUD screening tool derived from the Tobacco, Alcohol, Prescription medication and other Substance use (TAPS) tool. One site (12 clinics) had sufficient TAPS results for analysis. Screening counts and frequencies are reported.

Results: A total of 830 patients were identified as high risk by CCM-OUD from February 7, 2022, to August 31, 2022. TAPS was completed on 332 (40%), with 10 (3.0%) receiving a score >0, an indicator for possible OUD. A positive screen was found in 9 patients for prescription opioids and 1 patient for heroin; 2 patients had scores of >1.

Conclusion: Use of the Epic-derived CCM-OUD led to screening positivity rates similar to those found in studies not using a CCM, suggesting poor specificity of the CCM-OUD in identifying a population at high risk of OUD. Additional analysis to investigate CCM-OUD characteristics using validated screening tools is underway.

AGING

Understanding the Association of Early Integration of Palliative Care for Adult Patients With Heart Failure in the United States

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Background: Medical societies recommend implementing palliative care to patients with heart failure throughout the disease course. While uptake of palliative care for heart failure is emerging, palliative care consult (PCC) is often in late stages of disease. In this study, we examined trend and determinants of PCC among patients with newly diagnosed heart failure (NDHF) in the United States.

Methods: We identified adult NDHF patients in the Optum® de-identified electronic health record dataset in 2010–2018. We examined time from first diagnosis of heart failure to first PCC and rate of PCC after heart failure diagnosis. Time to PCC was modeled using Cox proportional hazards regression controlling for patient demographic and socioeconomic factors, comorbidities, and type of health care agencies.

Results: We identified 16,198 patients with NDHF who received palliative care in 2010–2018. Patients receiving PCC increased by 4.6% per year. Median time to receive first PCC was 244.5 days. Overall rates of first PCC in 3 and 5 years were 13.1% and 18.3%, respectively. Patients of older age, Caucasian, or having either Medicare, Medicaid, or both were more likely to receive palliative care. Additionally, prior cardiogenic shock (adjusted hazards ratio [95% CI]: 2.9 [2.7, 3.1]), implantation of cardiac defibrillator, visits at academic medical center (1.5 [1.4, 1.6]), and advance care planning (1.2 [1.1, 1.3]) were associated with PCC, while administration of inotropes was negatively related.

Conclusion: Despite rise of national uptake in recent years, rate of PCC remains low. Future research should seek to develop strategies to increase early integration of palliative care for heart failure.

Assessing the Impact of Comorbid Depressive and Anxiety Symptoms on Severity of Functional Impairment in Older Adults

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Background: Performing self-care and domestic life tasks are key measures of functional independence for older adults. While both depression and anxiety symptoms have been correlated with increased functional limitation, these two disorders are most often studied separately despite frequent co-occurrence and potentially interactive effects.

Methods: Using data from the National Social Life, Health, and Aging Project, this study examined the impact of comorbid depressive and anxiety symptoms on the severity of functional limitation (instrumental activities of daily living and activities of daily living) with multivariate logistic regression models, adjusted for covariates (age, gender, comorbidities, education, etc.). All analyses were weighted to account for sampling design.

Results: Unweighted sample size was 2935. Approximately one-third of respondents documented either depressive or anxiety symptoms, with 11% documenting both. Older adults with both depressive and anxiety symptoms reported the greatest number of functional limitations and the greatest difficulty with tasks assessed. In a multivariate linear regression, worse mental health status, greater age, increased comorbidity burden, and reduced income significantly predicted the severity of functional limitation. Depressive symptoms with and without anxiety symptoms were significantly associated with increasing severity of functional limitation when compared to those without either depressive or anxiety symptoms.

Conclusion: These results build on existing literature calling for a more holistic assessment of health — both physical and mental — and emphasize the need for mental health interventions as an avenue to increase functional independence in older adults.

Ethical Aspects of Physician Decision-Making for Deprescribing Among Older Adults With Dementia

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Background: Physicians endorse deprescribing unnecessary or risky medications but seek guidance on how to best approach deprescribing. We aimed to understand how physicians make deprescribing decisions.

Methods: Mailed survey sent to a random sample of physicians from the AMA Physician Masterfile who care for older adults. Survey questions using best-worst scaling methods reflected ethical principles of medical practice and common clinical scenarios in older adults with moderate dementia. Main outcome was a ranked list of factors with the potential to influence deprescribing decisions.

Results: Of 3000 surveys, 689 were complete to analyze. Factors influencing likelihood of deprescribing (ranked from greatest to smallest barrier) were: patient reporting symptomatic benefit from the medication; medication is prescribed by another clinician; concerns that stopping a medication might risk clinical instability; fear the patient or family might perceive the provider as “giving up” on care; treatment of risk factors that may affect future health; concerns about cultural mistrust of care; concerns about achieving quality metrics; time required to discuss deprescribing; and ease of paying for a medication.

Conclusion: Managing patient symptoms and well-being and working with other prescribers are priorities for clinicians caring for older adults with moderate dementia. Understanding clinician priorities can inform clinician and patient education about medication management and deprescribing.

Feasibility of Pharmacist-Led Telehealth Deprescribing for People With Dementia in Primary Care

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Background: Deprescribing strategies that align with patient goals are needed for people with dementia cared for by primary care providers.

Methods: This was a two-arm randomized pilot study of a pharmacist-led intervention designed to deprescribe by aligning medications with patient-care partner goals and preferences. The study was conducted from May 2021 to May 2022 at 2 health systems. People with dementia were eligible if ≥65 years of age, taking ≥5 medications, cared for in primary care, and able to identify a care partner who helps manage medications. Dyads were randomized to receive a 2-visit pharmacist telehealth intervention immediately (intervention) or delayed by 3 months (control). Medication outcomes were assessed in the control group before the pharmacist intervention.

Results: After 9 months, 69 dyads enrolled. Both pharmacist visits were completed by 24 (71%) in the intervention group and 26 (74%) in the control group. Primary care providers accepted pharmacists’ recommendations for 47 of 55 (84%) patients. After 3 months, 22 patients in the intervention group (65%) and 14 in the control group (40%) had ≥1 medication deprescribed; 20 patients in the intervention group (59%) and 12 in the control group (34%) had ≥1 new medication added.

Conclusion: To align with patient-care partner goals and preferences, both deprescribing and prescribing were recommended by the pharmacists. Pharmacist-led telehealth deprescribing was feasible and primary care providers engaged in it.
Receipt of Palliative Care Consultations Among U.S. Patients With Pancreatic Cancer During End-of-Life Period

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Background: Despite rise in palliative care uptake among patients with various types of cancers, little is known about palliative care uptake and associated outcomes for pancreatic cancer (PanC) in the United States. In this study, we determined incidence of palliative care consult (PCC) among patients with PanC in the last 6 months and 30 days of life, and difference in aggressive interventions varied by receipt of PCC.

Methods: We studied PCC received among patients with PanC in the Optum® de-identified electronic health record dataset who died in 2010–2018. The utilizations of chemotherapy, intensive care unit (ICU) admissions, or emergency department (ED) visits in the last 6 months and 30 days of life were compared between patients having and those not having PCC.

Results: We identified 2883 patients with PanC, of whom 858 received PCC in the last 6 months of life. Patients who had PCC were older at death (71 vs 69 years), male, Caucasian, and residing in Midwest. They were more likely to have chemotherapy (22% vs 11%), hospital (81% vs 38%) and ED (45% vs 24%) admissions, and ICU stays (14% vs 4%). The same pattern was found in the last 30 days of life among these PanC patients.

Conclusion: Uptake of PCC among PanC patients during the end of life is low despite very poor prognosis and health outcomes. While patient and provider awareness of palliative care has risen, our findings highlight the need to continuously improve delivery of palliative care for patients with PanC. Innovative interventions should be developed to better introduce and integrate palliative care with treatments for cancer.

Assessing the Value of Multidisciplinary Navigator Program for Lung Cancer Screening

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Background: Lung cancer screening (LCS) with low-dose computed tomography (LDCT) is recommended for heavy smokers, but the uptake is still low. The purpose of this study is to assess a multidisciplinary navigator program in facilitating referring providers to enroll the appropriate patients and to ensure patients get recommended LCS-LDCT and follow-ups.

Methods: A multidisciplinary navigator program for LCS-LDCT was implemented in a stepwise manner at a large health system starting in September 2019. Electronic health record data from 2018 to 2021 were extracted for all providers involved with LCS-LDCT and patients who received LCS-LDCT orders. The intervention effect on completion of the LCS-LDCT was tested using hierarchical generalized linear models.

Results: 977 patients participated in the multidisciplinary navigator program between September 2019 and March 2021. The annual LCS-LDCT completion rates among patients who received the navigator program and usual care were 68.2%–83.2% and 54.4%–58.8%, respectively. Patients in the navigator program were more likely to complete LCS-LDCT (adjusted odds ratio: 2.2, 95% CI: 1.4–3.5).

Conclusion: A multidisciplinary navigator program with a team of the ordering physician, pulmonologist, radiologist, thoracic surgeon, and oncologist is very effective in improving the LCS-LDCT completion rates in a large health system. For LCS-eligible patients and providers, it is an excellent opportunity to provide more standard process for facilitating LCS-LDCT in health systems.

Colorectal Cancer Screening Trends and Outcomes Among Kaiser Permanente Colorado Members, Ages 45–49, in 2022

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Background: The U.S. Preventive Services Task Force updated colorectal cancer (CRC) screening guidelines in 2021 and issued a “Grade B” recommendation to begin CRC screening at age 45, rather than 50. Mailed fecal immunohistochemical testing (FIT) is one strategy to bring the 45–49-year-old age group up to date with CRC screening, but data on FIT in this age group are limited.

Methods: We are evaluating FIT use comparing Kaiser Permanente (KP) members 45–49 years of age to those 50–54 years of age at KP Colorado (KPCO), KP Northern California, KP Southern California, and KP Washington, which began mailing FIT to 45–49-year-old members in 2022. We used preliminary data from KPCO to compare monthly FIT completions and percent positive (by chi-squared) between the 45–49 and 50–54 age groups.

Results: From January 1, 2022, to July 31, 2022, monthly FIT completions in 45–49-year-olds increased from 355 prior to the mailed FIT program to 1258 after the program; percent with a positive FIT was 5.9%. Among those 50–54-year-olds,
monthly FIT completions ranged from 403 to 606 and percent positive was 5.8%; FIT positivity was not significantly different between age groups (P=0.89).

**Conclusion:** CRC screening in 45–49-year-olds increased rapidly after launching a health system-wide mailed FIT program, and the percent with a positive FIT was similar to the 50–54 age group. Research is needed to identify additional approaches to bring those 45–49 years old up to date with CRC screening.

**Experience of the Prostate Cancer Navigation Program: Is the Virtual Navigation Associated With Shared Decision-Making and Patient Satisfaction?**

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**Background:** We sought to understand patient experience with prostate cancer navigation (PCN) and determine whether delivery method (virtual vs in-person) explains observed differences in patient experience.

**Methods:** We administered a cross-sectional survey to adult patients diagnosed with localized prostate cancer who received PCN at a large health system between 2019 and 2021. Multiple linear and logistic regression models were used to examine the association between navigation delivery mode and measures of shared decision-making, overall experience, and logistical support from and interpersonal relationships with nurse navigators.

**Results:** Telephone navigation (β: 0.33, standard error: 0.16) had a significant positive association with overall experience with the nurse navigator but not with shared decision-making or logistical support from and interpersonal relationships with nurse navigators. The most frequent suggestions for improvement by respondents include more/alternative treatment options, clearly defined roles/expectations in the decision-making process, and more information on postsurgery preparation.

**Conclusion:** Patients report better overall experience with virtual navigation compared to in-person navigation. For men with newly diagnosed localized prostate cancer, virtual navigation is an excellent opportunity for health systems to provide more efficient and scalable services to a larger population.

**Exploring Health Equity in Palliative Care Among Patients With Newly Diagnosed Metastatic Breast Cancer in a Large Midwestern Health System**

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**Background:** Palliative care has transitioned from end-of-life care to comprehensive treatment. The American Society for Clinical Oncology (ASCO) recommends a palliative care referral ≤8 weeks after an advanced cancer diagnosis. The number of women living with metastatic breast cancer (mBC) is increasing. Disparities in equitable treatment exist, yet little is known about how race/ethnicity and other social determinants of health (SDOH) impact the health equity of palliative care.

**Methods:** Electronic health records of patients (≥18 years) spanning Illinois and Wisconsin with an incident mBC diagnosis during 2020–2021 were extracted. Descriptive, chi-squared, and Fisher’s exact analyses were completed to describe the association between palliative care referral (yes/no) with race/ethnicity and SDOH.

**Results:** The cohort (n=4475) was mostly White (75%), non-Hispanic/Latino (91%), older (median age: 65 years), and women (>99%). Only 1% of patients received a palliative care referral, and median time to referral was 30 weeks. Most were single (46%), retired (54%), and on Medicare (58%). Few were widowed (21%), employed (10%), and on Medicaid (19%). Palliative care referrals differed by ethnicity (P=0.025) and SDOH factors (P<0.026).

**Conclusion:** Only 1% of patients with mBC received a palliative care referral, and the median referral time was more than 3-fold longer than ASCO’s recommendation. Palliative care differed by ethnicity and SDOH. These results present an opportunity to concurrently increase number and timing to referrals and equitable access to palliative care throughout the health system.

**Impact of a New Cancer Journey Companion Social Worker Program on Palliative Care Referrals**

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**Background:** Individuals with advanced cancer benefit from clear communication about their diagnosis, treatment, and goals of care. A “Cancer Journey Companion” (CJC) program was launched in 2019 to implement standard work for medical oncology social workers to address these needs.

**Methods:** This retrospective observational study included advanced care patients identified from August 2019 to March 2021 from a Northern California health care organization using electronic health records. Multivariable logistic regression model was used to examine the association between CJC intervention (vs usual care) and palliative care referrals, controlling for patient and clinical characteristics and accounting for clustering within providers.

**Results:** Of 784 patients identified (mean age: 69 years, standard deviation: 12.5), 44% were female, 60% had stage IV cancer, 52% were deceased by the end of follow-up period, 16% received the CJC intervention, and 25% received palliative care referrals within 6 months of identification. Patients receiving CJC were more likely to be referred to palliative care compared
to those receiving usual care (33.6% vs 23.5%; P=0.02). Similar association was shown in the adjusted analysis compared to the usual care group (odds ratio: 4.96, 95% CI: 1.54–15.99; P=0.01).

**Conclusion:** A standardized medical oncology social work intervention was associated with higher rates of palliative care referral. Given the many benefits of palliative care, the CJC program may be a scalable and powerful approach to improve patient care experience.

### Lung Cancer Screening Patient Characteristics and Outcomes in an Integrated Health System in Wisconsin

Oluwakemi Alonge, Robert T. Greenlee, Roxy Eibergen, Glen Buth, Erik Kronholm

**Background:** The U.S. Preventive Services Task Force recommends annual low-dose computed tomographic lung cancer screening (LCS) in high-risk populations (ie, adults 50–80 years of age with ≥20 pack-year smoking history who currently smoke or quit within the last 15 years). With national LCS uptake low, eligible groups are an important target for improving screening uptake and follow-up.

**Methods:** Using standardized electronic health record data through participation in National Cancer Institute’s Population-Based Research to Optimize the Screening Process Lung Consortium, we describe a cohort of patients who received baseline LCS from 2014 to 2019 at Marshfield Clinic Health System in Wisconsin.

**Results:** A total of 1619 patients had a baseline LCS, increasing substantially from 50 patients in 2014 to more than 500 in 2019. Of these, 784 (48%) were age 55–64 years and 845 (52%) were male; 1543 (95%) were non-Hispanic Whites, 947 (58%) were current smokers, 579 (36%) were former smokers, and 6% were of unknown status. Of baseline screens, 15% were assigned Lung-RADS 1 (no nodule/definitely benign), 54% Lung-RADS 2 (benign appearance), 10% Lung-RADS 3 (probably benign), and 6% Lung-RADS 4 (suspicious). Of 266 with a positive LCS (Lung-RADS 3 or 4), 44 (17%) were diagnosed with lung cancer.

**Conclusion:** LCS uptake among the underlying population is considerably lower than screenings in other organ systems. Understanding short- and long-term outcomes of LCS is needed to improve LCS care and increase uptake and adherence.

### Methodological Considerations for Evaluating the Impact of Longitudinal Colorectal Cancer Screening Behavior on Cancer Burden and Disparities

Patricia Mabry, Kristen Hassmiller Lich, Andrew Zinkel, Gregory Knowlton, Michael Maciosek, Nathaniel Osgood

**Background:** Colorectal cancer (CRC) is the third leading cause of cancer death in the United States. A recent study suggests real-world adherence to colonoscopy screening is low and its effectiveness may be lower than previously thought, raising questions about how evaluate and compare CRC screening outcomes. With early-onset CRC (age of <50 years) on the rise and an increase in screening outreach to close disparity gaps, there is an urgent need to understand the question: How does evaluation design influence CRC outcome estimates?

**Methods:** We report on a stylized microsimulation model designed to examine this question. We estimated downstream annual CRC incidence/deaths while systematically varying extreme (hypothetical) patterns of screening (via colonoscopy, fecal immunohistochemical testing, or no screening) over 30 years in a de-identified population of screening-eligible adults.

**Results:** CRC outcomes are highly dependent on 1) length of evaluation time horizon — shorter horizons show early benefit of stool-based tests relative to colonoscopies, largely due to censoring before the preventive benefits of colonoscopy are realized; and 2) patterns of adherence required for benefit differ by screening modality. To realize the same benefits at 30 years, lower levels of adherence are required for colonoscopy compared to stool tests.

**Conclusion:** This work illustrates how unwitting assumptions baked into evaluation design can lead decision makers to choose CRC screening programs that may yield outcomes that are at odds with their goals.

### Mixed-Methods Analysis of Patient and Caregiver Experiences of Advanced Cancer: Desire for Prognostic Information and Challenges Navigating Health Care

Ellis C. Dillon, Martina Li, Meghan Martinez, Amandeep Mann, Alyssa Hernandez, Su-Ying Liang, Natalia Colocci, Harold S. Luft, Steve Lai, Manali Patel

**Background:** Longitudinal information on the unmet needs of individuals with advanced cancer is lacking.

**Methods:** As part of a quality improvement initiative, a health care organization collected longitudinal patient survey data and interviewed caregivers of patients with advanced cancer.

**Results:** Among 483 patients, 281 (58.2%) completed at least one survey between October 17, 2019, and September 24, 2021, and 24 caregivers were interviewed. Mean age of surveyed patients was 68 years (standard deviation: 12.8); 54 patients (19.2%) died within 1 year. Surveys revealed greater needs at 1 month (vs 4, 8, and 12 months). At 1 month, 20.5% reported an emergency department visit, 23.3% reported hospitalizations, 29.9% wanted prognostic information, and 59% reported not yet discussing palliative care with clinical teams. Qualitative data revealed varied individual needs. However, two common themes were 1) desire for more information about prognosis (“I’d like to know when my time is going to come”); and 2) issues managing the complexity of health care (“The billing
was the worst part of my illness”; “It’s been very stressful to manage the [Oxycodone] refill and get med in time”).

**Conclusion:** Longitudinal data on patients with advanced cancer suggest variability in needs, but common issues included desires for prognostic information, earlier palliative care discussions, and problems navigating the health system. Strategies should address questions around prognosis and discussions of palliative care and target patients most in need to ensure better care delivery.

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**Rethinking Cancer Care Through Stakeholder Engagement: The Citizen Scientist Cancer Curriculum**

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**Background:** At the University of Florida (UF), citizen scientists (CS) play a pivotal role in research through their involvement on research teams throughout the health science center. This was made possible partly through an online curriculum about clinical research basics created for, and in collaboration with, CS. The UF Health Cancer Center (UFHCC) sought to apply this approach to its research.

**Methods:** Following a needs assessment gauging the interests of UFHCC leadership, researchers, and CS, UFHCC created a new course that offers information about cancer as a health condition and as a research topic. The course includes didactic lessons with assessments, as well as case studies, interviews, an animated video, and a behind-the-scenes lab meeting to demonstrate what CS may experience once they join a research team.

**Results:** The mean score of all CS (n=9) for all assessment items in the course was 96%. Half of the group had a perfect score or missed only one of the questions. In addition, 80% of the posttest participants reported feeling confident in their ability to apply what they learned to their work as a CS.

**Conclusion:** Engaging all stakeholders from the beginning of the process ensured continued support for the project. By developing relationships and acquiring knowledge through the curriculum, CS can give well-reasoned, actionable feedback developing relationships and acquiring knowledge through the curriculum, CS can give well-reasoned, actionable feedback.

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**Patient Experiences Using an Online Family History Cancer Risk Assessment**


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**Background:** Hereditary cancer risk assessment is a multidisciplinary process of estimating likelihood for developing cancer based on family history. Little is known about acceptability of online methods for collecting family history for inherited cancer risk assessment. We present qualitative data from a large, population-based study at Kaiser Permanente among adult health members.

**Methods:** The Family History study is a randomized, comparative effectiveness-implementation trial assessing 3 methods for capturing family cancer history. Study and health system personnel follow up with those at moderate or high hereditary cancer risk. Participants were randomly selected to participate in phone interview. A theoretical framework guided the analysis of results.

**Results:** 43 interviews have been completed to date. We completed 23 interviews with participants randomized to the brief online interview and 20 randomized to the full pedigree assessment. Of the total participants, 24 were deemed average risk, 3 at moderate risk, and 16 at high risk for hereditary cancer conditions. They had limited concerns about the functionality of the survey.

**Conclusion:** Preliminary findings suggest online cancer risk assessment is acceptable to patients, but more consideration should be dedicated to patient education on how to interpret...
results and what steps to take based on risk level results. We will explore intragroup differences by risk level, online assessment method, and other sociodemographic and clinical characteristics.

Using National Cancer Registry Data to Identify Women at High Risk of Breast Cancer

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Background: In Israel, BRCA tests are offered for free for women of Ashkenazi descent, but many women remain untested. In this study, we aimed at identifying women at high risk of breast cancer using data on family history of cancer from the Israeli national cancer registry.

Methods: We used the Ontario family history assessment tool (FHAT) to score all females, 26 to 45 years of age, in a one 2.6-million-member HMO in Israel (Maccabi Healthcare Services). Data on breast, ovary, prostate, and pancreatic cancer history among parents and siblings of the study cohort were retrieved from the national cancer registry since 1965. These data were used to calculate individual FHAT scores.

Results: A total of 377,931 eligible women were included in the analysis. A relevant family history of cancer was detected in 20,386 (5.4%), with FHAT scores ranging from 1 to 16. A greater score was calculated with increasing age and among individuals with a history of breast cancer.

Conclusion: Using individual-level data from national cancer registries may assist in detecting women with a relevant family history of cancer.

CHRONIC CONDITIONS

Associations Between Social Determinants of Health and Total Health Care Cost in an Integrated Delivery Network

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Background: Kaiser Permanente (KP) has long sought to improve the health of its members while maintaining a sustainable business model. The social determinants of health play an important role in this mission. This quality improvement project aims to identify associations between patient-reported social risk and total health care cost in an organization-wide sample of KP members.

Methods: A survey asking about financial, housing, food, and transportation needs was administered by KP Social Needs Network for Evaluation and Translation (SONNET) in 2020 to KP members from all 8 regions. Multivariable regression analyses were performed to determine associations between social risk and total direct cost for all services paid for by the health plan in 2019.

Results: A total of 10,226 survey responses were collected (23% response rate). In a model controlling for demographic covariates (gender, race, and region), moderate and severe social risk were associated with health care cost 13% (P=0.02) and 48% (P<0.001) higher, respectively, than no risk. When medical risk was added to the model, a 10% increase in medical risk was associated with 2.8% higher cost (P<0.001), but the association between social risk and cost was attenuated, suggesting that comorbidity may be a powerful mediator of this relationship.

Conclusion: As KP seeks to improve health, better understanding these relationships is essential as reform strategies may depend on whether a business case can be made for investing in social determinants of health.

Prescribing Inert or Not? Quantitative Investigation of Loop Diuretics Prescribing After Palliative Care Consultation Among Patients With Heart Failure

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Background: Loop diuretics are the first-line pharmacotherapy to address heart failure (HF)-associated edema and dyspnea. However, it remains unclear if palliative care consultation (PCC) affects prescribing of diuretics for adults with HF.

Methods: We studied the prescribing of loop diuretics on HF patients in a national electronic health record database before and after the first PCC after patients were diagnosed with HF.

Results: In 2010 to 2018, 5969 patients with newly diagnosed HF received at least one PCC, among whom 2539 (42.5%) were prescribed with loop diuretics before and 1552 (26.0%) after their first PCC. Despite a decrease in loop diuretics prescription rate straddling the date of PCC, post-PCC loop diuretics prescribing was strongly associated with pre-PCC prescribing (adjusted odds ratio [95% CI]: 3.2 [2.8, 3.7]) and varied by age at first PCC, year of HF diagnosis (2.1 [1.9, 2.4]), and months from HF diagnosis to first PCC. In addition, we also found difference in prescribing among geographic regions in the United States.

Conclusion: While PCC is expected to reduce polypharmacy, strong association between pre- and post-PCC indicates prescribing inertia. Future research should investigate benefits and harms of polypharmacy among specific patient groups to help develop personalized treatment for HF.

Virtual Care for Asthma Management by Primary Care Physicians Can Improve Asthma Control for Patients

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Background: Half of asthma patients have poor asthma control. Many patients do not have adequate access to physicians for asthma care. We describe a study where patients with access to virtual care showed improved asthma control.

Methods: We performed a retrospective observational study within a population of patients with asthma who had access to a secure text messaging platform with primary care physicians for asthma care. Baseline and follow-up Asthma Control Test (ACT™) questionnaire scores were used to measure asthma control. The Wilcoxon signed-rank statistical analysis was used to determine the before and after differences in ACT scores for each patient. The paired t-test was used to determine the effect size and P-values.

Results: The average initial ACT score was 11.4 (range: 6–19, 95% CI: 9.8, 13.0). The average final ACT score was 17.7 (range: 6–24, 95% CI: 15.8, 19.5). The average difference between the initial and final ACT scores was 6.3 (95% CI: 4.2, 8.3). The ACT score difference was highly significant with a large effect size of 1.22 and a P-value of <0.0001.

Conclusion: Our study demonstrated that asthma patients managed by primary care physicians using a virtual care modality can significantly increase the control of their asthma as measured by their ACT™ scores. Virtual care may be an important tool for primary care physicians to help asthma patients improve the control of their asthma.

Adoption of Self-Measured Blood Pressure Monitoring in Underserved Communities: A Prospective Observational Pilot

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Background: Self-measured blood pressure (SMBP) monitoring is recommended in clinical practice guidelines for patients with hypertension. However, uptake in primary care remains low, especially among low-income patients with limited resources. This prospective observational pilot evaluates the feasibility of implementing SMBP in a primary care setting in the South Side of Chicago serving a racially/ethnically diverse patient population with unmet social needs.

Methods: Patients with hypertension were provided with an SMBP machine and were invited to attend monthly hypertension-related education sessions. Patients could enter SMBP values on a manual log or using patient portals. Electronic health record data will be extracted at 6 months for each patient to evaluate the adoption of SMBP and explore changes in blood pressure.

Results: A total of 100 machines were distributed to eligible patients with hypertension. Most patients (n=97) enrolled in the education sessions. The primary implementation outcome of this pilot will be the adoption of SMBP measured by the number of patients who provided SMBP values to the clinic staff at least once a month. The primary exploratory outcome will be a change in systolic blood pressure, with a 5-mmHg decrease considered clinically significant.

Conclusion: Results from this pilot study will inform the feasibility of a multisite randomized controlled trial to test the effectiveness and implementation success of SMBP in a large community health system.

Association of Medical Assistant-Supported Virtual Rooming With EHR-Documented Vital Signs and Health Behaviors in Patients With Diabetes

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Background: Whether telemedicine visits can achieve reliable electronic health record (EHR) capture of patient-reported behavioral and vital signs data remains uncertain. In this study setting, during the COVID-19 pandemic, medical assistants (MA) helped virtually “room” patients scheduled for video visits by assisting in visit preparation prior to the provider joining.

Methods: We examined associations between MA-supported video visit rooming and EHR vitals and behavioral history documentation among patients with diabetes. We identified completed primary care video visits, for any reason, by patients with diabetes between June 1, 2020, and March 31, 2021. Visits were categorized as with or without MA-supported rooming. We used modified Poisson regression to evaluate the association between MA-supported rooming and EHR documentation of vital signs (blood pressure, weight) or health behaviors (alcohol, smoking), adjusted for patient race, age, sex, socioeconomic status, internet access, primary language, visit reason, and month, then generated adjusted percentages.

Results: After adjustment, video visits with MA-supported rooming (54.2% of all visits) had statistically significantly higher rates of any EHR-documented vital signs or health behaviors (54% vs 34.8% in non-MA-supported visits).

Conclusion: Medical assistant-supported virtual visit rooming may substantially improve capture of patient health quality metrics, especially as telemedicine remains popular postpandemic for patients with chronic conditions.

Qualitative Analysis of the Goals Rural Patients Would Include in Their Personalized Care Plan if They Received Care From a Primary Care Medical Home

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Background: Primary care medical homes (PCMHs) augment care by aligning delivery with patients’ needs. Because rural patients often forego care until their disease has significantly progressed, personalized care plans, one component of PCMH, may be beneficial. Patients work with their provider to identify goals to improve their health. Thus, it is important to know what rural patients would include in a care plan.
Methods: To assess rural patients’ goals for their care plans, we surveyed a convenience sample of rural Amazon Mechanical Turk Workers (N=121). Respondents were asked, “Thinking about your current health and health-related behaviors, what goals would you include in your personalized care plan?” A content analysis of open-ended responses was conducted using NVivo software.

Results: Top goals included weight loss (n=9) and fitness (n=9), followed by diet (n=7) and heart health (n=6). Other goals included affordable care, maintaining health, specialists, coping with chronic conditions, mental health concerns, preventive care, time, and transparency. Only 4 respondents indicated that they wouldn’t include any goals.

Conclusion: Rural respondents identified goals that would contribute to improving their health and well-being. Therefore, personalized care plans may be a useful tool for improving rural populations morbidity and mortality rates by engaging patients in preventive care.

Acceptability of Remote Chronic Pain Self-Management Interventions: Preliminary Results From the RESOLVE Study

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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 through: 1) self-guided web-based learning; or 2) health coach counseling via telephone/video.

Methods: We interviewed participants 3 months after intervention completion and selected a purposeful sample of 10 per arm (N=20) to explore the acceptability of remotely delivered CBT-CP. Mean age of participants was 63; 70% were female. Their most common pain conditions were back/arthritis. We summarized interviews and compared them by arm.

Results: Activity-rest cycling and progressive relaxation skills were rated most helpful; cognitive skills were least helpful. Facilitators of participation included convenience, the weekly pace of lessons, and a workbook of intervention content. Barriers included health issues and competing demands. Web-based participants noted technological issues and lower skills maintenance.

Conclusion: Participants in both arms found remotely delivered CBT-CP to be acceptable, convenient, understandable, and effective. Future analyses with a larger sample will include subgroup analyses using patient-reported outcomes and other trial data.

Emergency Department Visits in Parkinson’s Disease: Impact of Comorbid Conditions

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Background: Older adults have complex medical conditions that can lead to high emergency department (ED) usage. Parkinson’s disease is one such condition that can also be comorbid with other chronic diseases. This study examines a cohort of patients with Parkinson’s and identifies comorbidities that are risk factors for specific ED-presenting conditions.

Methods: Using de-identified electronic health record data, patients with Parkinson’s were identified based on ICD-9/10 diagnosis codes. We then conducted a 4-class latent class analysis (LCA) to classify patients with ED visits based on their preexisting comorbid conditions. We conducted logistic regression models with the outcome of reason-for-visit to determine the associations with comorbidity-profile class, patient demographics, and socioeconomic characteristics.

Results: The most common reasons for ED admission were injuries, diseases of the circulatory system, and general signs and symptoms. Compared to those in the “Poorest Health” classification of the LCA, both the “Diabetic” and “Non-Diabetic” classes had greater odds for a circulatory system admission and reduced odds of admission for digestive system disease and injury or poisoning. Those classified as “Diabetic” were less likely to be admitted for a nervous system disease compared to those in “Poorest Health.”

Conclusion: Clarifying the complex medical needs of patients with Parkinson’s disease is the first step to further individualize care, which may reduce ED visits in this population and improve quality of life.

Evaluation of a Remote Patient Monitoring Program Implementation in Community Health Centers

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Background: Community health center (CHC) patients experience disproportionate prevalence of chronic conditions and face barriers in accessing technologies that can be used to support disease management. Remote patient monitoring (RPM) experienced a surge in use during the COVID-19 pandemic. This provided an opportunity to understand how CHCs implemented an RPM program.

Methods: We retrospectively evaluated the factors affecting acceptability, appropriateness, and feasibility of a suite of RPM tools made available through a grant to CHCs. Data included
Impact of a Multifaceted Best Practice Alert Among Patients With Headaches Seen in Primary Care

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Background: Fifty percent of patients referred from Geisinger primary care to neurology for headaches did not receive appropriate first-line therapy prior to referral, prompting the development of a multifunctional best practice alert (BPA) to help primary care providers (PCP) manage patients with headaches. This project evaluated the impact of the BPA implemented in primary care sites on neurology referrals, headache treatment, and emergency department (ED) visits.

Methods: We conducted a cluster-randomized study across 38 primary care sites within eligible adult patients with a primary headache or migraine visit diagnosis who consented at enrollment. We randomized clinics into usual care (n=19) or intervention (n=19), which included a multifunctional BPA presented at the time of diagnosis entry. We used generalized estimating equations models to do a difference-in-difference (DID) analysis adjusting for demographics to compare neurology referrals, headache treatment, and ED visits initially through 6 months between groups.

Results: We enrolled 203 patients across the system. We observed no significant difference between groups in both adjusted and unadjusted analysis for ED visits (change from baseline: 4.1% for intervention, 1.3% for usual care; DID adjusted odds ratio [AOR]: 3.4, 95% CI: 0.9–12.7), neurology referrals (change from baseline: 2.4% for intervention, 1.6% for usual care; DID AOR: 1.6, 95% CI: 0.9–3.0), or headache treatment (change from baseline: 2.7% for intervention, 3.5% for usual care; DID AOR: 0.9, 95% CI: 0.6–1.3).

Conclusion: We found that implementation of the BPA tool in primary care did not reduce referrals to neurology and ED visits or improve headache treatment selection.

Leveraging the Virtual Data Warehouse to Describe Health Care Utilization in a Diverse Patient Sample With Systemic Sclerosis

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Background: Systemic sclerosis (SSc) is a rare autoimmune disease requiring multidisciplinary care. Utilization studies for rare diseases often rely on claims data with limited detail.

Methods: Using the virtual data warehouse (VDW) that includes electronic health record and claims data, SSc health care utilization was explored in an integrated health system. Most recent 12-month demographic, encounter, and service data for patients with ≥1 year of enrollment from 2005 to 2019 were extracted. Encounters were stratified by type — further organized by CPT-4 (Category I), Healthcare Common Procedure Coding System, and ICD-9/10-PCS codes — tabulated and described. Medication utilization was estimated by unique medications and daily medication burden.

Results: Of the 191 patients with SSc, mean age was 59.4 ± 14.3 years and 90% were female; racial/ethnic demographics were categorized as Black (36%), White (28%), Hispanic (13%), or Asian (11%). Medians for Charlson Comorbidity Index, unique medications, and estimated daily medication burden were 4, 10, and 3.3, respectively. Of the 5347 encounters, 58% were ambulatory, 15% lab only, 13% virtual care, 9% radiology, and 4% emergency/acute inpatient stays. Of 19,480 procedures, most involved laboratory/pathology (53%), medicine (13%), and evaluation/management (13%) CPT-4 service groupings.

Conclusion: Health care utilization in SSc occurred mainly in ambulatory settings and involved substantial laboratory, medical, and evaluation/management procedures. Future work will translate observed utilization into costs using publicly available fee schedules.

Modifiable Features of a Group Weight Loss Program: The Patient Perspective

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Background: The Group Lifestyle Balance™ (GLB) program, approved by the Centers for Disease Control and Prevention for type 2 diabetes (T2D) prevention, has been associated with clinically significant weight loss and decreases in risk factors for T2D and cardiovascular disease in community settings.
However, a major challenge has been participant retention and sustained engagement. Little is known about participant preference for key customizable structural aspects of program that may influence program acceptability.

**Methods:** We conducted a discrete choice experiment at Sutter Health, inviting 122,744 GLB-eligible patients with elevated body mass index (>25) to complete an online survey. The questions addressed 4 aspects of the program: delivery mode, facilitator type, timing, and session format.

**Results:** Surveys were completed by 6923 (5.6%) of those invited. Two-thirds of respondents reported a preference to meet online with live video vs in-person (64.2%) and that the program be set in the health system vs in the community setting (68.6%). Weekday daytime hours were preferred over evenings or weekends (56.2%). Most preferred the addition of private sessions (72.9%) and a lifestyle coach with formal clinical training (80.9%).

**Conclusion:** Patients preferred several modifiable features of GLB, including delivery mode, timing, and format of program sessions. Understanding and optimizing these factors for subpopulations is important for improving intervention uptake and retention. Multivariable analysis is forthcoming to determine preferences for subgroups.

**Observed Rise in Intradialytic Hypotension Despite Cooled Temperature Among Hospitalized Patients**

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**Background:** Cardiovascular morbidity/mortality rates are 10–30 times higher for patients receiving hemodialysis (HD), suggesting HD-specific risk factors. In 15%–25% of dialysis treatments, intradialytic hypotension (IDH) impairs end-organ perfusion. Cooling dialysate of <36.5°C reduces IDH in outpatient settings, but its effect is unknown in hospitalized patients in acute physiologic distress.

**Methods:** In 2019, inpatients on HD (n=17,357) were evaluated at Kaiser Permanente Southern California. Relationship between temperature and IDH was analyzed using multivariable repeated measure models. Model covariates include age, gender, race, utilization, hospital duration, HD sessions, HD starting temperature, starting blood pressure, fluid removed, body mass index, and Elixhauser index.

**Results:** IDH occurred in 31% of inpatient HD sessions. Lower starting dialysate temps were associated with increased IDH. Several statistically significant factors increased risk for IDH: age of >65, female sex, lower starting BP, higher fluid removal, body mass index of <18.5, Elixhauser of >11. Prolonged hospitalizations were associated with higher rate of IDH: ≤3 days = <25% IDH vs 4–9 days = 30% IDH vs ≥10 days = 43% IDH; P<0.001.

**Conclusion:** IDH remains a challenge in delivering dialysis treatments. It occurs more frequently in inpatient settings, with higher prevalence in lower dialysate temperatures, and is associated with prolonged hospitalizations. Further work is warranted to understand the relationship between dialysate temperature and IDH to identify factors amendable to change to minimize IDH.

**Statin Treatment for Primary Prevention of Cardiovascular Disease: Treatment Intensity and Adherence Patterns Within the First Year**

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**Background:** Statins are recommended as the first line of pharmacotherapy for primary prevention of atherosclerotic cardiovascular disease. However, statin adherence remains suboptimal. This study assesses statin nonadherence within the first year after statin initiation and further evaluates the impact of nonadherence on low-density lipoprotein (LDL) cholesterol control.

**Methods:** For 120,264 patients who were 50–75 years old and had no evidence of atherosclerotic cardiovascular disease at the time of the first statin prescription during 2010–2021, multivariable logistic regression models were used to identify risk factors associated with nonadherence. Cox regression models were developed to assess the impact of nonadherence, intensity, and the pattern change on LDL control.

**Results:** Black or Hispanic patients, age of <65 years, having Medicaid insurance or self-pay groups, and patients with less health care utilization were less likely to receive statin. Patients with higher baseline statin intensity were almost twice more likely to have LDL controlled. Nonadherent or statin-discontinued patients were 40% less likely to have LDL controlled, while the statin switch impacted LDL control to a lesser degree as compared to baseline statin intensity and adherence.

**Conclusion:** Disparity is observed in statin adherence, highlighting that barriers to nonadherence go beyond the traditional barriers in taking medication. Strategies that address health equity should be considered in statin adherence.

**Uptake of Guideline-Directed Medical Therapy Among Patients With Heart Failure With Reduced Ejection Fraction, and Association With 1-Year Mortality, in a Real-World Setting**

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**Background:** Guideline-directed medical therapy (GDMT) for heart failure with reduced ejection fraction (HFrEF) can significantly reduce mortality. However, GDMT uptake is still
low. We used real-world data to understand GDMT medication use among patients with HFrEF and learn its association with mortality in a large health system.

**Methods:** Electronic health records were used to identify the first evidence of meeting HFrEF criteria (ICD9/10 code or ejection fraction of <40%) among adult patients in 2018–2021. Survival analysis was applied to assess the association between GDMT and 1-year all-cause mortality, adjusted with other baseline characteristics.

**Results:** 26,679 patients were included and analyzed, among which 93.1% were 50 years old or older and more than half (60.1%) were male; racial/ethnic demographics were 64.6% non-Hispanic White, 9.6% African American, 8.2% Asian, and 10% Hispanic. Disease burden was high: hypertension (77%), diabetes mellitus (42%), atrial fibrillation (48%), chronic kidney disease (45%), chronic obstructive pulmonary disease (19%), and myocardial infarction (20%). Within this study population, 53% had 1 or more GDMT medication but only 6% had 3 or more GDMTs, indicating significant treatment gaps. Total number of GDMT medications was highly associated with mortality and with a strong dose-effect. Compared to patients without any GDMT medication, odds for mortality reduced 10% for 1 GDMT (hazard ratio: 0.90 [95% CI: 0.82, 0.98]), 24% for 2 GDMTs (0.76 [0.68, 0.85]), 31% for 3 GDMTs (0.69 [0.58, 0.82]), and as high as 73% for patients with all 4 GDMTs (0.27 [0.038, 1.92]).

**Conclusion:** GDMT has remarkably reduced 1-year mortality for newly diagnosed HFrEF. Strong dose-effect implies that patients should be on as many GDMT as possible, if they can tolerate, to optimize the effect.

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**Wellness Coaching for Kids: Population Characteristics of a Pragmatic Trial Using Motivational Interviewing in Pediatric Practices**

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**Background:** Objective of this study was to describe the process of the clinic selection process for the pragmatic cluster-randomized trial, Wellness Coaching for Kids (WC4K), a motivational interviewing (MI)-based intervention in pediatric practices. Pediatricians, trained in MI, in coordination with wellness coaches by phone, counsel parents of children (3–8 years old) with overweight or obesity.

**Methods:** A randomized control trial, BMI2+ (Brief MI on Pediatric Obesity in Primary Care; PI: Resnicow) provided groundwork for WC4K, a trial with 49 (61.3%) participating Kaiser Permanente Southern California (KPSC) pediatric clinics, selected for serving populations of more minorities and with lower income, then randomized into the intervention or control arm. The intervention and control clinic populations were then compared to KPSC source populations also 3–8 years of age.

**Results:** We identified 291,178 KPSC members, 3–8 years of age, of which 92,314 (31.7%) received services in intervention and 75,822 (26%) in control clinics. The demographics were similar with regard to sex (51.1% male), mean age ± standard deviation (6.1 ± 1.7 years), and mean body mass index (17.3 vs 17.2 ± 3.1 kg/m²) but had different racial/ethnic make-up (55.0% vs 46.8% Hispanic and 8.6% vs 6.7% Black) and more children from areas with a high neighborhood deprivation index (24.9% vs 20.0%).

**Conclusion:** WC4K will provide resources to populations with higher needs and intervene with parents of children with overweight and obesity using client-centered communication to motivate families to modify health behaviors.

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**Why Patients Opt Out of Receiving Electronic Messages From Health Care Systems**

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**Background:** Health systems increasingly send patients electronic communications from various providers and departments. Electronic messages are an affordable and effective means to communicate information to patients. However, uncoordinated communications across an organization can prompt recipients to opt out of future messages. We examined why patients opted out of receiving electronic communications at Kaiser Permanente (KP) Colorado.

**Methods:** We interviewed patients with type 2 diabetes, some of whom had opted out of text/IVR messaging within the prior month. We also analyzed “stop text” messages sent by KP patients from 2015 to 2022, some of which included text explaining the reason for opting out. We then developed categories that reflected types of stop messages. Messages and interviews were reviewed and classified until thematic saturation was reached.

**Results:** We conducted 13 qualitative interviews with KP patients, 8 of whom had opted out. We also categorized 410 (9%) random messages out of 4480 stop messages. Four themes emerged: 1) Message content irrelevant or impersonal (eg, flu shot reminders sent to vaccinated patients); 2) Too many repeat messages sent through multiple channels; 3) Unclear on the consequences of actions taken in response to messages, leading to unintentional opt-outs; and 4) Deceased, no longer members, or wrong number.

**Conclusion:** Based on these findings, we identified potential actions to reduce opt-outs, such as more effective use of existing KP data and changes in opt-out language.
Reach and Effectiveness of an Initiative in the Health Care Setting to Screen and Refer Patients for Social Needs

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Background: Kaiser Permanente invested in a referral platform that allows health care providers to make referrals to community organizations (CBOs) providing services to address social needs. We will discuss the reach and effectiveness of the initiative, overall and by demographic characteristics.

Methods: Study participants were referred for social needs from February 2020 to May 2022. The platform collects data from screening for needs, to starting and accepting referral, to the CBO addressing the need. A subset of participants completed baseline and 3-month surveys assessing change in needs burden and self-reported health. Descriptive statistics and chi-squared analyses assessed differences in reach across the care cascade; t-tests and chi-squared analyses assessed effectiveness of addressing needs.

Results: A total of 10,620 individuals received a referral. Older individuals represented 31% of those with needs and 52% of those with needs addressed. Hispanic individuals made up 26% of those with needs but only 17% of those with needs addressed. Members wanting help with a food need decreased for cases between baseline and follow-up (42% to 32%). Cases and controls reported similar general health and overall satisfaction with Kaiser Permanente at follow-up.

Conclusion: As health care organizations implement social care interventions, it is important to understand which populations may need additional outreach to equitably access these services and which outcomes are most likely to be impacted.

COVID-19 and OTHER VACCINE-RELATED CONDITIONS

A Safety Study Evaluating Non-COVID-19 Mortality Risk Following COVID-19 Vaccination

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Background: Deaths following COVID-19 vaccination should be contextualized with expected background mortality or mortality in comparators in epidemiological studies. We conducted a cohort study to evaluate the risk of non-COVID-19 mortality after COVID-19 vaccination while adjusting for individual and community risk factors.

Methods: This study consisted of members from 7 Vaccine Safety Datalink sites during December 14, 2020–August 31, 2021. Crude non-COVID-19 mortality rates were reported by vaccine type, age, sex, and race. The counting process survival model was used to analyze non-COVID-19 mortality allowing vaccination status to change. We used calendar time as the basic time scale to implicitly adjust for temporal trend factors. A propensity score approach was used to adjust for the potential imbalance in confounders.

Results: Crude non-COVID-19 mortality rates among vaccinees were lower than those among comparators across all subgroups. After adjusting for confounders, adjusted hazard ratios were 0.46 (95% CI: 0.44–0.49) after dose 1 and 0.48 (0.46–0.50) after dose 2 of the BNT162b2 vaccine, 0.41 (0.39–0.44) after dose 1 and 0.38 (0.37–0.40) after dose 2 of the mRNA-1273 vaccine, and 0.55 (0.51–0.59) after Ad26.COV2.S.

Conclusion: While residual confounding bias remained after adjusting for several confounders, no increased risk was found for non-COVID-19 mortality among recipients of 3 COVID-19 vaccines in the United States.

Linguistic Disparities in COVID-19 Vaccine Uptake

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Background: Disaggregating race and ethnicity data by language preference may add granularity to COVID-19 outcomes for vaccine uptake, hospitalizations, and deaths in a large health system.

Methods: We evaluated outcomes from December 15, 2020, to April 1, 2022, in adult patients, by race/ethnicity, interpreter need, language preference other than English (LPOE), and primary language for any with >500 speakers. Monthly age-standardized outcome rates were graphically displayed and overall age-adjusted hazard ratios (HR), and rate ratios (RR) were estimated.

Results: We studied 851,410 patients; 4% LPOE and 3% interpreter need. Marked temporal clusters were observed for COVID-19 vaccination uptake, hospitalizations, and death associated with first vaccine eligibility, booster vaccination, and COVID-19 variants. First vaccine delays resulted in HR of 0.83 (95% CI: 0.82–0.84) for LPOE and HR of 0.81 (0.80–0.82) for interpreter need. Higher rates were observed for LPOE hospitalizations (RR: 1.85, 95% CI: 1.63–2.08) and deaths (RR: 2.13 [1.65–2.69]), and for interpreter need hospitalizations (RR: 1.98 [1.73–2.25]) and deaths (RR: 2.32 [1.79–2.95]).
Lowest vaccination uptake and highest hospitalizations and deaths were in Black patients and Eastern European language speakers. Highest vaccination was in Asian cohorts, without lower hospitalization and death rates.

**Conclusion:** Collecting patient language uncovers disparities and allows for interventions to improve health equity across all segments of the population.

### Vaccine Effectiveness in Persons Who Have Experienced Homelessness and Incarceration

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**Background:** SARS-CoV-2 infections disproportionately impact socially vulnerable groups including those who experience homelessness or incarceration. COVID-19 vaccine effectiveness in these vulnerable populations has not been fully evaluated.

**Methods:** We evaluated COVID-19 vaccine effectiveness against SARS-CoV-2-related hospital admissions during Omicron predominance in patients ≥18 years of age with care at 1 of 8 Minnesota EHR Consortium sites. We created two cohorts: 1) vulnerable (with a history of homelessness or incarceration); and 2) nonvulnerable. We matched vulnerable to nonvulnerable 1:3, based on propensity to be vulnerable. Vaccine effectiveness of primary series and booster dose was estimated using a time-dependent covariate Cox model.

**Results:** The vulnerable cohort included 79,889 patients and the nonvulnerable 240,000 patients. Among the vulnerable cohort, 70.5% were unvaccinated. Vaccine effectiveness after a booster dose was 70% (95% CI: 54–80) for the vulnerable population and 80% (95% CI: 74–85) for the nonvulnerable population. Vaccine effectiveness 150 days after the primary series was 53% (95% CI: 43–62) for the vulnerable population and 73% (95% CI: 63–82) for the nonvulnerable population.

**Conclusion:** Vaccine effectiveness in patients who experienced homelessness and incarceration was similar to a matched cohort of nonvulnerable patients. Booster vaccination is important for prevention against severe COVID-19 disease among people who experience homelessness and incarceration.

### Association Between Antibodies to SARS-CoV-2 and Reinfection in Colorado: A Prospective Cohort Study

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**Background:** The objective was to determine the association between SARS-CoV-2 seronegative status and reinfection.

**Methods:** For this nested case-control study, we recruited Kaiser Permanente Colorado members (≥18 years old) from June 15, 2020, to March 28, 2021. Participants were encouraged to complete viral and antibody testing every 28 days for 10 months. Participants with a positive viral test were followed for reinfection (repeat positive viral test ≥90 days after the first positive test). Participants with reinfection (case patients) were matched to controls without reinfection by age, sex, first positive viral test date, last serological test date, and antibody test type (nucleocapsid or one of two spike tests). Using conditional logistic regression, case patients were compared to controls with respect to the last positive antibody result, adjusting for demographic and clinical confounders.

**Results:** Among 4235 participants, 2033 had at least one positive viral test, in whom the reinfection rate was 0.52/100 person-months. Among 80 eligible case patients, the last antibody test was negative in 15.0%, whereas it was negative in 7.5% of 1034 controls. The reinfection risk was 2.73-fold (95% CI: 1.34, 5.54) higher among seronegative participants, with Hispanic ethnicity (odds ratio: 1.86, 95% CI: 1.13, 3.08) and household size (odds ratio: 1.14, 95% CI: 1.01, 1.28, for each additional household member) also associated with reinfection.

**Conclusion:** Seronegativity, Hispanic ethnicity, and increasing household size were associated with reinfection.

### Association of Social Risk Factors With Emergency Department and Inpatient Hospitalization Encounters Before and During the COVID-19 Pandemic

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**Background:** Exposure to adverse social conditions — such as housing instability — may contribute to undesirable health care utilization. This cross-sectional study employed a multistage stratified sampling framework to examine the association of social risk with emergency department (ED) visits and hospitalizations and whether any such relationships varied before and during the COVID-19 pandemic.

**Methods:** Kaiser Permanente National Social Needs Survey data for 7309 members were linked with electronic health records to identify ED and hospitalization encounters. Social risk was assessed across 5 domains: housing instability, food insecurity, financial strain, transportation, and social isolation. Adjusted weighted regression analyses were employed to examined relationships.

**Results:** Adults with 1 or more social risk domains were 33% more likely to have an ED encounter compared to those with...
no risk. Housing instability, food insecurity, and financial strain were associated with increased risk of ED encounters. Social risk was not associated with hospitalizations, with the exception of social isolation. These relationships did not vary before and during the pandemic.

**Conclusion:** The relationships between social risk and ED encounters were more pronounced compared to the relationships between social risk and hospitalization encounters. The consistent association between ED encounters and social risk before and during the pandemic suggests that factors beyond the clinic walls continued to play a significant role in influencing health care utilization.

**Communication Preferences of COVID-19 Vaccine-Hesitant Individuals: A Qualitative Study**

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**Background:** Primary care providers play a critical role in promoting vaccination, which may be particularly important for populations at risk of COVID-19 vaccine hesitancy and health disparities. Our goal was to understand COVID-19 vaccine-hesitant individuals’ views of health care provider messaging encouraging uptake of COVID-19 vaccines.

**Methods:** We conducted focus groups (n=14) between August and October 2021 with COVID-19 vaccine-hesitant participants (n=35) in English and Spanish. Focus groups elicited reactions to texts from primary care providers recommending vaccination and videos of doctors addressing concerns about COVID-19 vaccines. Focus groups were recorded and transcribed. Transcripts were coded using thematic analysis.

**Results:** Participants preferred specific, clear, and unbiased information about COVID-19 vaccines from providers who appeared genuine. They reacted negatively to perceived minimization of risks (“don’t overpromise the lack of side effects”). Participants disliked feeling “force fed” recommendations, preferring primary care providers to “address those concerns. Like with real compassion and empathy.”

**Conclusion:** Our findings suggest that health care providers seeking to promote COVID-19 vaccination should provide specific, clear, and unbiased information about COVID-19 vaccines. In addition, vaccine-hesitant individuals may be more receptive when this information is delivered in a genuine, personable, and respectful way.

**COVID-19 Vaccine Intentions and Receipt of COVID-19 Vaccines in Children 5 to 17 Years**

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**Background:** Aims of this observational study were to describe vaccine intentions and receipt of COVID-19 vaccines in a Midwestern health system.

**Methods:** Starting May 2021 for those 12–17 years of age and November 2021 for those 5–11 years of age, vaccine status was assessed at well visits and recorded in the health record as “COVID vaccine completed or in progress,” “Patient/families declines COVID vaccine after discussion and my recommendation,” or “Patient/family undecided about COVID vaccine after discussion and my recommendation.” Receipt and timing of COVID-19 vaccines came from our state immunization registry.

**Results:** From May 19, 2021, to November 15, 2021, among 7094 adolescents 12–17 years old, 74% reported the COVID-19 vaccine series was completed or in progress, 15% declined vaccination, and 11% were undecided. Of declined and undecided, 17% and 32%, respectively, received one or more COVID-19 vaccine doses at the index visit or follow-up. From November 15, 2021, to August 31, 2022, of 5295 adolescents, 94% reported they had initiated or completed the vaccine series and <2% remained unvaccinated at follow-up. Among 6158 5–11-year-olds, from November 15, 2021, to August 31, 2022, 61% reported initiating or completing the vaccine series, 26% declined, and 13% were undecided. Of declined and undecided, 3% and 9%, respectively, received one or more COVID-19 vaccine doses at the index visit or follow-up.

**Conclusion:** Continued efforts are needed to promote COVID-19 vaccination in children whose parents refuse or are undecided about vaccination.

**Decomposing Racial Disparities in Flu Vaccination Rates, 2016–2021**

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**Background:** Kaiser Permanente (KP) works hard to vaccinate all of its members against the flu, but flu vaccination rates (FVR) vary across race and ethnicity and are often below the 70% Healthy People target. Reducing racial disparities in FVR requires a better understanding of factors contributing to differential vaccination rates.

**Methods:** KP Georgia and KP Mid-Atlantic States conducted a study to evaluate FVR among members from 2016 to 2021. FVR were extracted from the electronic health record alongside patient covariates. Using the Oaxaca-Blinder method, we assessed the relative contribution of covariates to differences in FVR among non-Hispanic White (NHW) and non-Hispanic Black (NHB) members.
Results: FVR among NHB adults ranged from 13% to 18% points lower than NHW. The Oaxaca-Blinder method revealed differences in age, area deprivation index, and patient portal registration explained 25%–30% of FVR disparity. Health care use and comorbidities were less relevant. Differences in FVR among teens ranged from 3% to 12%. Area deprivation index, health care use and patient portal registration explained 40%–75% of the disparity. 

Conclusion: The Oaxaca-Blinder method found differences in vaccination rates among NHW and NHB members were only partially explained by covariates in the electronic health record and mostly nonmodifiable. Results suggest patient portal registration may improve flu vaccination rates.

Differences in Delayed and Forgone Care Among Adults by English Proficiency During the COVID-19 Pandemic

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Background: During the early COVID-19 pandemic, approximately 40% of U.S. adults have delayed or forgone care, but little is known about how adults with limited English proficiency (LEP) fared. We assessed the impact of English proficiency on delayed and forgone health care services.

Methods: Cross-sectional data from the 2020 National Health Interview Survey (July–December 2020; n=16,937) were collected. Main outcomes were delayed and forgone health care due to cost or COVID-19. Delayed health care included medical care, dental care, mental health care, and prescription medicines. Forgone health care also included home care.

Results: Adults with LEP reported more delayed (48%) and forgone (41%) health care compared to English-proficient adults (40% and 30%, respectively). Differences in delayed and forgone health care by proficiency were not significant after adjusting for socioeconomic factors. Proficiency-specific multivariate results found insurance, health, and race/ethnicity to be associated with delayed and forgone health care among adults with LEP.

Conclusion: Adults with LEP were more likely to experience challenges accessing health care during the early stages of the pandemic. While differences in delayed and forgone health care were explained by socioeconomic factors, this may have been due to differences in perceived need for care or other unmeasured barriers. Policymakers, payers, and clinicians must address long-standing barriers to access and affordability of needed health care for adults with LEP.

Impacts of COVID-19 Pandemic on Breast Cancer Diagnosis and Costs of Care

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Background: While a substantial decrease in cancer screenings occurred early in the COVID-19 pandemic, relatively little is known about the impacts of COVID-19 on the extent of delays in new breast cancer diagnoses and subsequent total costs of care (TCC). We examined these patterns using data from an integrated health system in Northern California.

Methods: This is a retrospective observational study of patients with breast cancer diagnosed between July 2019 and March 2021. We calculated the number of breast cancer diagnoses before and during the pandemic. Mann-Whitney tests were used to compare TCC (standardized at 150% Medicare rate) during the 12 months following cancer diagnosis between pre-COVID-19 and ongoing COVID-19 eras.

Results: Of 3654 patients with breast cancer, 43% were diagnosed during the pandemic. There was an 18% reduction in new diagnoses during the first year of the pandemic (monthly average of 121 cases vs 148 cases prepandemic), with a 39% reduction in the first 3 months. TCC were comparable between the two groups (median costs of $17,534 during the pandemic vs $17,376 prepandemic; P=0.73).

Conclusion: There were fewer breast cancer diagnoses in the first year of the COVID-19 pandemic, but resource use was similar among those diagnosed and managed during that time period. Future work is needed to understand whether there is a longer-term impact of delayed diagnosis on health outcomes.

Increased Identification of Vaccines Through Bidirectional Communication With the Minnesota Immunization Information Connection

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Background: HealthPartners’ Vaccine Safety Datalink team maintains a vaccine file for the eligible population. Previously the file included vaccines from medical claims, pharmacy claims, and the electronic health record (EHR). As of May 20, 2021, we began to receive vaccine data from Minnesota Immunization Information Connection (MIIC), the state immunization information system. We aim to evaluate the capture of vaccines from established data sources and the additional capture from MIIC.

Methods: Every 2 weeks we prepare a cohort and upload it to the secure MIIC data exchange website for matching. We prepare a vaccine crosswalk for desired groups of vaccines, implement the de-duplication, and quality check procedures locally. We evaluated the capture of COVID-19 and influenza vaccine in people 6 months old and older, monovalent vaccine in adults, human papillomavirus (HPV) vaccine in people 9–26 years old, rotavirus vaccine in infants 0–8 months old, diptheria, tetanus, and pertussis (DtaP) vaccine in kids 0–6 years old, pneumococcal conjugate vaccine 13 (PCV13) in kids
0–2 years old, and measles, mumps, rubella (MMR) vaccine in kids 1–6 years old.

**Results:** As of February 4, 2023, 2,086,658 COVID-19 vaccines, 7,150,221 influenza vaccines, 2981 monkeypox vaccines, 619,626 HPV vaccines, 392,394 rotavirus vaccines, 1,218,184 DTaP vaccines, 471,165 PCV13 vaccines, and 453,125 MMR vaccines were identified. For COVID-19, 1,149,819 (64%) vaccines were identified from the EHR, 124,223 (7%) from claims, 128,482 (7%) from pharmacy, and an additional 400,649 (22%) from MIIC. For monkeypox, 401 (32%) were identified from the EHR, 64 (5%) from claims, and 777 (63%) from MIIC. For DTaP, 640,619 (57%) were identified from the EHR, 221,052 (20%) from claims, and 262,501 (23%) from MIIC. For HPV, 394,770 (68%) were identified from the EHR, 91,025 (16%) from claims, 75 (<1%) from pharmacy, and 93,979 (16%) from MIIC.

**Conclusion:** The availability of MIIC data has substantially improved identification of vaccines in our Vaccine Safety Datalink population and is critical for monitoring vaccines administered outside of the medical home.

**Model Impact Assessment of the Revised COVAS (Comorbidities Obesity Vitals Age Sex) Score**

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**Background:** The COVAS Score (based on comorbidities, obesity, vitals, age, and sex) is an emergency department (ED) decision support tool for patients with COVID-19 to identify risk of respiratory decompensation or death within 7 days. Originally developed/validated during March 1–April 30, 2020, it was updated in July 2020 to include urgent care visits, most abnormal vitals in past 24 hours, and revised score cut-offs.

**Methods:** Model impact was assessed from July 2020–February 2022 at Kaiser Permanente Southern California. Descriptive utilization statistics and proportion of hospitalizations for each COVAS Score risk strata to show trends following model implementation. Performance metrics include area under the curve (AUC), decision curve analysis, and calibration plots. Subpopulation AUCs for age, sex, race/ethnicity, and body mass index (BMI).

**Results:** A total of 2013 providers utilized the COVAS Score in 37,346 ED/urgent care visits for 34,622 patients. Model performance improved for ED visits with a COVID test, from AUC of 0.79 to 0.83. Subpopulation AUCs were 0.78 for age of ≥75 years, 0.88 for female sex, 0.85 for Black race, and 0.86 for BMI of ≥40. Calibration was good for low-risk patients and decision curve analysis showed net benefit over event threshold probabilities (0%–10%).

**Conclusion:** COVID-19 remains a challenge with new variants and low uptake of boosters; future surges may strain hospital resources and clinicians. This underscores the importance of conducting noncontemporaneous evaluations of novel risk assessment models such as the COVAS Score. Model performance improved since derivation and provider utilization trends aligned with surges in cases.

**Symptoms Consistent With Post-Acute Sequelae of COVID-19 (PASC) in Two Health Systems**

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**Background:** The objective of this study was to understand the prevalence of symptoms consistent with post-acute sequelae of COVID-19 (PASC) and the association between SARS-CoV-2 seropositivity and symptoms.

**Methods:** We recruited English- and Spanish-speaking members, >18 years of age, from Kaiser Permanente Colorado and Kaiser Permanente Southern California who had viral and serological (nucleocapsid or spike protein-based) testing as of August 2021. Between October 2021 and April 2022, participants completed a survey assessing sociodemographics, prior COVID-19 infection and testing, and validated symptom scales on potential PASC symptoms. Survey results were linked to electronic health record data on lab results, vaccination, health service use, and medications.

**Results:** Across the 2 regions, 3946 members were included in the analysis (26% response rate). Participants answered surveys in English (96%) and Spanish (4%) via online (67%) and paper (33%) survey. The mean respondent age was 52 years (standard deviation: 15.6), the majority were female (68%), and 28% identified as Hispanic. In participants who reported having COVID-19, 49.8% reported having at least 1 or more symptoms that lasted over 12 weeks, and the most common symptoms included fatigue (56.6%), brain fog or focus issues (48.3%), and shortness of breath (41.6%).

**Conclusion:** Understanding the prevalence of symptoms consistent with PASC can help understand the natural history of COVID-19 infection. Future research will assess the between serostatus and symptoms consistent with PASC.

**The Role of Attitudes in Explaining Racial Differences in Self-Reported Influenza Vaccination During Pregnancy**

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Generating and Testing Analogies to Promote Vaccine Uptake

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Background: The COVID-19 pandemic has highlighted the challenges in communicating the benefits of vaccination and created an urgent need to combat misinformation. Analogies compare two situations to point out parallels. We sought to identify analogies that might encourage vaccine-hesitant adults to think differently about vaccination.

Methods: Two online surveys were issued using an online panel. Survey 1 respondents rated researcher-generated vaccination analogies and generated new analogies. We characterized respondents’ analogies using content analysis. Survey 2 respondents rated researcher- and respondent-generated analogies.

Results: Of 400 invitees, 271 (68%) responded. The highest rated researcher-generated analogy overall was “Getting vaccinated is like wearing a seatbelt. You may still get in an accident but if you do, you will be safer.” Among vaccine-hesitant respondents to Survey 2, the highest rated analogy was one generated by an unvaccinated respondent: “Getting vaccinated is like putting on a suit of armor. There are vulnerable points, but overall, you are pretty well protected.” Analyses of respondent-generated analogies found vaccinated respondents were more likely than unvaccinated respondents to write analogies containing references to protecting oneself or others (63% vs 38%, respectively).

Conclusion: We identified analogies that vaccine-hesitant adults responded positively to, providing a basis for future research on the impact of analogies in promoting vaccination.

GENOMICS and PRECISION MEDICINE

Genetic Testing of Individuals With Ovarian Cancer: Concordance With Guidelines for Testing Across Three Health Systems

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Background: Ovarian cancer is the fifth leading cause of cancer death in U.S. women. National guidelines recommending genetic testing for all women with ovarian cancer at the time of diagnosis were published in 2017. This Feasibility and Assessment of a Cascade Traceback Screening (FACTS) study includes assessment of baseline implementation of the guideline across 3 health systems: Geisinger, Kaiser Permanente Washington, and Kaiser Permanente Mid-Atlantic States.

Methods: We conducted a retrospective analysis to identify all patients diagnosed with ovarian, fallopian, or peritoneal cancer across the 3 health systems. We assessed baseline genetic testing rates of all patients and baseline testing since 2017 within a year from diagnosis. Differences within and between sites in implementation by age, stage, and other variables will be explored.

Results: Of patients diagnosed since 2017, 23% at Geisinger had guideline-concordant testing (93% within 1 year). At Kaiser Permanente Washington, 62% had testing (44% within 1 year). At Kaiser Permanente Mid-Atlantic States, 75% had testing (94% within 1 year). Additional issues were identified in the availability of complete tumor registry data not being available at each site, and we found limits on identifying genetic testing through electronic data only.

Conclusion: Implementation of testing for all patients with ovarian cancer at the time of diagnosis is variable across systems, and uptake of genetic testing remains limited. Using tumor registry data to identify eligible individuals may be an effective first step in implementing traceback genetic testing programs.
Implementation of a Traceback Genetic Testing Program: the Feasibility and Assessment of a Cascade Traceback Screening (FACTS) Study

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Background: National guidelines recommend genetic testing for patients newly diagnosed with ovarian cancer and cascade testing for at-risk relatives, but uptake remains low. Traceback programs, where patients are retrospectively contacted and offered testing, could help address this gap.

Methods: We implemented traceback cascade testing approaches at 3 integrated health systems: Geisinger, Kaiser Permanente Washington, and Kaiser Permanente Mid-Atlantic States. We used administrative data to identify living patients with recorded ovarian, fallopian, or peritoneal cancer with no record of previous genetic testing. Intervention activities included outreach, explanation of the program, an educational video, phone outreach, and offer of genetic testing. Each system site follows usual care workflows for genetic counseling, testing, follow-up, and cascade testing. Program elements differ as needed per organizational context. We assessed early participation rates.

Results: To date, we have approached 355 patients across sites. Participation is 32% (range: 12% to 54%), and active refusal rates are 20% (range: 7% to 33%). Ability to order testing during outreach and ongoing navigation may contribute to participation rates. Forthcoming analyses include qualitative interviews with program participants, active refusers, and at-risk relatives to assess acceptability, variant detection, and cascade testing.

Conclusion: Traceback programs are feasible in integrated health systems and can increase guideline-concordant genetic testing.

Preemptive CYP2C19 Genotyping to Inform P2Y12 Inhibitor Therapy: Real-World Outcome Data From Sanford Health

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Background: Evidence that CYP2C19 genotyping ordered specifically to inform P2Y12 inhibitor therapy improves patient outcomes has generated excitement about the potential benefits of preemptive genotyping, where testing occurs prior to a medication need.

Methods: We abstracted data about patients who received new orders for P2Y12 therapy at Sanford Health between January 2018 and September 2020 and received preemptive or early reactive CYP2C19 genotyping. We examined initial P2Y12 inhibitor selections, major adverse cardiovascular events (MACE), and bleeding events. We defined preemptive and early reactive genotyping as testing that was completed more than 7 days before or within 7 days of P2Y12 inhibitor initiation, respectively.

Results: Analyses included 131 patients who received preemptive genotyping and 763 patients who received early reactive genotyping. Across phenotypes, 1.5% of the preemptive genotyping group and 3.0% of the early reactive genotyping group experienced MACE events in the month following initiation of therapy (P=0.24 for difference). The proportion in each group experiencing bleeding events during the first month did not differ (1.5% vs 0.8%; P=0.41), but at 1 year, bleeding events were observed more often in preemptive genotyping group than the early reactive genotyping group (7.6% vs 3.8%; P=0.047).

Conclusion: Preemptive genotyping impacts P2Y12 inhibitor therapy efficacy similar to early reactive genotyping, but may increase bleeding risks.

Validation of a Patient-Facing Online Risk Assessment Tool for Hereditary Cancer Screening in Primary Care

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Background: Population-level screening for hereditary cancer risk is important. The PCORI FAMILY Study (IHS-2017C3-9211) randomized primary care participants to usual care (Arm 1) vs 1 of 2 online family history collection tools for hereditary cancer screening (Arms 2 and 3). We report on the performance of the online family history collection tools used in Arms 2 and 3.

Methods: We manually reviewed results for 398 participants to determine the validity of the electronic risk assessment. Arm 2 utilized patient-facing online clinical prediction rules (BRST and PREMM5). Arm 3 employed patient-facing online 3-generation pedigree collection with automated evaluation for clinical hereditary risk criteria (NCCN/Kaiser, BRST, PREMM5, Tyrer Cuzick).

Results: In Arm 2, after BRST V.1 upgrade to V.3, 10.4% (19 of 181) of cases went from average to high risk. In Arm
3, misclassification was 8% (17 of 217) and stemmed from 1) non-use of competing mortality for the Tyrer Cuzick model; 2) incorrect identification as high risk for NCCN rare cancer syndromes, and 3) data import errors into the study database. All issues were resolved.

**Conclusion:** An online family history collection tool performs well to automatically screen and risk stratify the population for hereditary cancer risk. A validation period is needed to 1) confirm employed prediction models and clinical criteria are up to date, 2) achieve stakeholder consensus on accepted clinical risk stratification criteria, and 3) resolve technical issues.

### Implementing Pharmacogenomics in Clinical Practice: Challenges, Realities, and Progress

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**Background:** Pharmacogenomic testing (PGx) utilizing high-throughput panels provides results on a broader range of genetic variants than just those relevant to a specific treatment. Managing this additional information in the electronic health record creates unique legal, ethical, social, financial, and practice issues that need to be addressed.

**Methods:** We developed a business model to inform the decision to create a Pharmacogenomics Specialist Ambulatory Pharmacist position. An advisory group was formed to guide educational and training needs for all stakeholders and to lend provider perspective to the development of clinical decision support to facilitate delivery and interpretation of test results.

**Results:** Clinical workflows, ordering, billing, and reporting processes were revised to accommodate this effort. The volume of PGx testing more than doubled in the first year of this new position. More than 125 individuals were tested for clinically actionable results related to cancer, cardiovascular, or psychiatric treatment options and now have these results in their electronic health record.

**Conclusion:** Progress to date underscores the significance of having a centralized and standardized approach to managing all aspects of PGx. Awareness of the value of PGx in clinical practice, recognition of testing appropriateness, and engagement of providers in outreach and consultations is integral to the success and sustainability of this effort.

### Identifying Disparities in HPV Vaccination Coverage by Language Group

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**Background:** Disparities in human papillomavirus (HPV) vaccination coverage are present both among and within racial/ethnic groups. Preferred language may contribute to variable coverage within racial/ethnic subgroups.

**Methods:** We evaluated HPV coverage in patients turning 13 years of age during 2017–2021. We evaluated HPV vaccine uptake (receipt of ≥1 HPV vaccine) and HPV vaccination series completion. We compared coverage by calendar year, language groups, race/ethnicity, insurance type, and sex, adjusted for sex, calendar year, and public insurance.

**Results:** We included 63,150 13-year-olds, 50.5% female and 7.7% with non-English language preference. HPV coverage increased annually from 2017 to 2020, then plateaued in 2020 at 72.3% (uptake) and 40.9% (series completion). Uptake was lower in English-prefering patients (67.6%) compared with Spanish (77.6%), Karen/Burmese (85.2%), and Vietnamese (78.8%) language groups and higher compared with Somali (56.8%), Ethiopian (59.4%), and Eastern European (27.0%) language groups. Multivariable model showed the largest differences in coverage by race/ethnicity across all factors.

**Conclusion:** Standardized, routine collection and reporting of language preference in health care data is imperative for...
improved patient-provider communication and to identify disparities in health outcomes. Further work is needed to understand HPV vaccination barriers and develop culturally appropriate educational messages in patient and caregivers’ preferred languages.

Moving From Small- to Large-Scale Implementation of Pediatric Adverse Childhood Experiences (ACE) Screening: Lessons Learned From Kaiser Permanente Southern California

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Background: Screening for adverse childhood experiences (ACE) in primary care settings has been increasing as a response to consistent evidence of the deleterious associations between ACE and later physical and mental health. Within Kaiser Permanente Southern California (KPSC), ACEs screening was adopted in six pediatrics clinics in June 2018 and is currently being implemented across the region. We describe our process and ongoing adaptations.

Methods: The ACE screening and referral workflow was implemented in June 2022 at 28 clinics in KPSC. Screening is initiated by a proactive office encounter for any child between 2 and 18 years of age who has not had an ACE screen in the past 12 months. The pediatrician refers any positive screen (score of ≥1 and behavioral and/or mental health symptoms) to a social worker who completes a psychosocial assessment to identify service needs. The social worker provides a warm handoff to behavioral health via phone.

Results: Between June 1 and August 31, 2022, 40,035 patients were screened and 22% reported a score of 1 or more ACE. Thus far, several challenges have been identified: 1) mixed feelings from providers about the screening; 2) insufficient time to adequately address the purpose; 3) confusion about chart documentation; and 4) low uptake of parenting classes with an external community partner. To address these issues several modifications were initiated.

Conclusion: ACE screening is generally well-received, but there are still hurdles to attain consistent screening practices.

New Methods for Linking Deliveries and Infants

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Background: Maternal-infant links are needed for research on infant outcomes related to maternal health and care, such as the safety of vaccines or medications in pregnancy. Birth certificates are a common source but may be quite lagged and require a time-intensive process to obtain the data, followed by complicated probabilistic linking and data cleaning. To address these challenges, we built an algorithm to create links that do not rely on birth certificates and can be regularly updated.

Methods: We started by using standard sources, such as care management and subscriber data, and simple name-address matching. To increase our match rate, we added new sources, such as parental proxies for infant online accounts. We created decision logic to settle any conflicts among sources. We are using the new algorithm to update our datafiles for the Centers for Disease Control and Prevention’s Vaccine Safety Datalink (VSD) project, which assesses the safety of vaccines in pregnancy. As part of this process, we will cross-validate the updated VSD files against existing 2015–2018 birth certificate data and present our findings.

Results: In a previous 2001–2014 file, we linked 95% of deliveries with infants. For 2015–2021, we achieved a 91% linkage rate, even without birth certificate data. We also enhanced link quality by better identifying delivery date, twins, and duplicates.

Conclusion: Using a mix of data sources and a streamlined process, we can now readily update maternal-child links and provide more timely data to the VSD.

MENTAL HEALTH

Self-Reported Use and Perceived Importance of Digital Mental Health App Attributes From a Diverse Sample in an Integrated Health-System

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Background: Beginning December 2019, Kaiser Permanente Mid-Atlantic States integrated digital mental health app (DMHA) referrals into clinical care. Therefore, this research sought patient perspectives about DMHA usage and perceived importance of engagement (E), functionality (F), design (D), and information (I) attributes.

Methods: An online survey was developed, tested for face and content validity, and piloted with a random patient sample previously referred to ≥1 DMHA from April 2021 to December 2021. After telephone outreach, 119 patients were emailed a survey link.

Results: Of the 58 patients (49%) who completed the survey, 44 (76%) confirmed DMHA referral. The sample was mainly female (n=32, 73%), had at least a 4-year college degree (n=32, 73%), and were Black/African American (n=18, 41%) or White (n=17, 39%). Of the 44 referrals, 12 (27%) respondents screened positive for anxiety symptoms and 10 (23%) for depression; 27 (61%) respondents reported DMHA use for ≤6 months since referral, with up to 50% reporting use within the past 30 days, depending on DMHA; 19 (43%) respondents reported DMHAs were very or extremely helpful for improving mental
and emotional health. The most important DMHA attributes by domain were fun and interesting to use (E), easy to learn how to use (F), visual appeal (D), and well-written goal- and topic-relevant content (I).

**Conclusion:** Uptake and persistent use of DMHAs was modest. Patients perceived important attributes to be a focus on fun/interesting, ease of use, visual appeal, and goal-specific content.

**Effectiveness of Integrating Mental Health in Primary Care for Suicide Prevention: A Cluster-Randomized Implementation Evaluation**

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**Background:** Our objective was to describe effectiveness of an integrated mental health (IMH) program in primary care to support suicide risk mitigation.

**Methods:** Kaiser Permanente Washington implemented IMH across 22 clinics, January 2016–July 2018, using 3 strategies: practice coaching, electronic health record (EHR) decision support, and performance monitoring/feedback. Clinical practice and patient measures relied on EHR and insurance claims data to compare usual care versus intervention periods, including 1) documented safety planning within 14 days following population-based screening and suicide risk assessment, and 2) documented suicide attempts/deaths within 90 days of a visit. Mixed-effects logistic regression models were used to model binary outcome indicators, adjusted for randomization stratification and calendar time, and accounted for repeated outcomes from the same site. Monthly outcome rates (per 10,000 patients) were estimated via marginal standardization.

**Results:** A total of 789 patients made 953,402 primary care visits in the usual care period, and 228,255 patients made 615,511 visits in the intervention period. The rates of safety planning increase from 39.6 to 46.2 per 10,000 patients ($P=0.0007$); suicide attempts within 90 days decreased from 6.5 to 4.9 per 10,000 patients ($P=0.01$).

**Conclusion:** Implementation of a program designed to support high-quality mental health care in primary care appeared effective for risk mitigation, both increasing safety planning and reducing suicide attempts.

**Evaluation of Gender Expression Care: A Novel Treatment Program Using Novel Data**

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**Background:** Many challenges facing transgender individuals occur in social environments. The field of Gender Expression Care (GEC) augments traditional care programs of mental health, hormone therapy, and surgery to bridge gaps in gender dysphoria care. Without integrated support and education, patients are frequently left to self-exploration of unvetted advice obtained largely from inconsistent online lay sources. Such advice can result in poor outcomes, especially in disadvantaged populations, highlighting inequities in access to professional coaching or other reliable resources.

**Methods:** To address these inequities, Kaiser Permanente Northern California created a novel GEC program, providing care for 8 cohorts of transitioning individuals to date; data collection began with cohort 4. Because no transgender-specific instruments exist, we present initial findings for changes in several mental health scales from baseline to postprogram.

**Results:** For 88 participants with complete data in cohorts 4–8, mean 9-item Patient Health Questionnaire (PHQ-9) scores improved by 1 point (change: -1.01; $P=0.04$). Mean 2-item Generalized Anxiety Disorder (GAD-2) scores were similar pre- and postprogram (change: -0.16; $P=0.35$). Number of days in the past 30 with poor mental health (change: -2.15; $P=0.047$) or interference with usual activities (change: -1.87; $P=0.048$) both decreased by about 2 days.

**Conclusion:** Preliminary data collected before and after participation in the GEC program show promising trends in quality of life and mental health status. Work is underway to create and validate a transgender-specific instrument.

**Comparing In-Person, Telephonic, and Video-Based Treatment of Depression in Adult Primary Care During the COVID-19 Pandemic**

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**Background:** This study aimed to determine if processes of care for patients with depression were different between in-person, telephonic, or video visits in adult primary care.

**Methods:** Participants were patients, age of ≥18 years, from a large integrated health system in Southern California who received a new diagnosis of depression during a primary care visit of any kind from March 1, 2020 to May 21, 2021. Patients were followed through June 30, 2022, to determine care processes related to depression. Differences between visit types were tested using the chi-squared statistic and 1-way ANOVA.

**Results:** A total of 34,011 patients were included in the sample; 17,752 (52%) had an in-person visit, 11,966 (35%) had a telephone visit, and 4293 (13%) had a video visit. Patients who had telephone visits were younger, more likely to be women,
and less likely to be African American. Patients who had in-person visits were the most likely to complete a 9-item Patient Health Questionnaire (PHQ-9) at the time of diagnosis and have any follow-up. For patients initially diagnosed with moderate-to-severe symptoms of depression (n=9620), those who had a telephone visit were most likely to have a depression-related medication ordered and more likely to have follow-up in psychiatry. Patients with in-person visits were most likely to receive their medication.

**Conclusion:** Depression-related care processes differ among in-person and telephonic/video visits. Further research is needed to understand the causes and impacts of these differences.

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**Care Quality After Enrollment in a Telehealth, Pharmacist-Led, Collaborative Care Program for People With Severe and Persistent Mental Illness**

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**Background:** People with schizophrenia, bipolar disorder, and other severe and persistent mental illness are at high risk for suicide, recurrent hospitalizations, and diabetes. We evaluated a novel 100% telehealth collaborative care program led by clinical pharmacists seeking to improve care quality for these patients.

**Methods:** We included 968 program enrollees as of January–June 2021 and 8339 usual care patients (all from Kaiser Permanente Northern California). Expected 6-month changes were increased psychotropic medication adherence, glycemic labs, and annual psychiatrist visits as well as reduced emergency department (ED) use. We used difference-in-differences models with overlap weighting to account for around 300 baseline variables.

**Results:** Study participants had a mean age of 45 years; 41% were Asian, Black, Hispanic, or Pacific Islander; 26% had schizophrenia or other psychotic disorder. From baseline to 6 months, program enrollees had increased rates of medication adherence (+13%) and glycemic screening (+26%) and lower psychiatrist visit rates (-16%) compared to usual care in the same period (P<0.01 for all). No change in ED use was shown.

**Conclusion:** A new telehealth-based, clinical pharmacist-led collaborative care model shows promise in helping individuals maintain adherence and respond early to physical health complications during psychiatric treatment. Program pharmacists may meet needs formerly addressed by psychiatrists.

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**Depression and Total Knee Arthroplasty in Patients With Knee Osteoarthritis**

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**Background:** Knee osteoarthritis is a common cause of disability and chronic pain that can end in total knee arthroplasty (TKA). Depression is common in patients with osteoarthritis and is associated with poorer postoperative outcomes following TKA, but it is not known if depression is associated with risk of TKA.

**Methods:** This retrospective study used 2010–2018 electronic health record data. Patients were 45–80 years old, with ICD-9/10 code for knee osteoarthritis in 2010–2011. Depression was defined via an ICD-9/10 code. TKA was defined via CPT code or ICD 9/10 code. Entropy balancing controlled for confounding. Cox proportional hazard models before and after entropy balancing assessed the relationship of depression and TKA.

**Results:** In the eligible sample (n=9466), 75% were 55–80 years of age, 83.3% were White, and 10.4% had depression at baseline. About 22% of the sample had TKA in follow-up (incidence rate: 45.1/1000 person-years). There was no relationship of depression and TKA before and after controlling for confounding (hazard ratio: 0.97; 95% CI: 0.84–1.12).

**Conclusion:** Depression is not associated with increased risk for TKA. This may reflect the complex relationship between depression, knee osteoarthritis symptoms, and knee osteoarthritis treatment. Further research should identify potential subgroups in which depression might impact risk for TKA.

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**Differential Item Functioning of the PHQ-9 Between Adults From Diverse Racial and Ethnic Groups: A Retrospective Cohort Study**

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**Background:** Health systems use measurement-based care in screening for depression and suicidality, all while aiming to make health care more equitable for diverse racial and ethnic groups. Part of health equity is ensuring screening tools work similarly between different groups.
Methods: In this retrospective study, we assessed the differential item functioning (DIF) of the 9-item Patient Health Questionnaire (PHQ-9) for adult (18–64 years of age) patients with mental health and/or substance use disorder (SUD) diagnoses and a completed PHQ-9 on record seen in primary care or mental health visits at 1 of 8 health systems in the Mental Health Research Network from January 1, 2009, to September 30, 2017 (n=755,156). Two random samples of 1000 were drawn from the following groups (n=14,000): Hispanic, non-Hispanic White, Black, Asian, American Indian/Alaska Native, Native Hawaiian/Other Pacific Islander, and multiracial. All groups were compared. We assessed uniform and nonuniform DIF with hybrid ordinal logistic regression and item response theory (Bonferroni’s correction P<0.00556). Change in R² of <0.035 was considered a negligible effect size.

Results: Eight PHQ-9 items had significant uniform or nonuniform DIF, albeit negligible, that differed for most but not all items and groups between random samples. Racial and ethnic groups were derived from common categories available in the electronic health record.

Conclusion: As broad racial and ethnic groups may mask within-group heterogeneity, our results suggest that disaggregation of racial and ethnic groups may provide more detail on PHQ-9 DIF.

Secure Text Messaging Between Patients and Physicians Is Effective for Management of Depression and Anxiety

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Background: Depression and anxiety can cause marked impairment. Lack of access to mental health services exacerbates mental health problems. The COVID-19 pandemic worsened access to mental health care. A secure text messaging app is available to patients 24/7/365. This access may help increase access to mental health care.

Methods: We performed a retrospective observational study of patients using Chat for mental health care. We used Wilcoxon signed-rank analysis to evaluate the change in 9-item Patient Health Questionnaire (PHQ-9) and 7-item Generalized Anxiety Disorder (GAD-7) scores.

Results: Initially, 82.1% of the patients had moderate to severe depression with an average initial PHQ-9 of 15.2 (95% CI: 14.5 to 15.8). Their final PHQ-9 decreased an average of 7.4 points (95% CI: 7.8 to 7.9), with 68.8% of patients with no or mild depression (P<0.001). Of the 352 patients with GAD-7, their mean initial GAD-7 score of 13.7 (95% CI: 13.3 to 14.2) decreased an average of 6.2 points (95% CI: 5.6 to 6.7; P<0.001). Of the 294 patients (83.5%) with moderate to severe GAD-7, 244 patients (69.3%) had a final GAD-7 score of <10, corresponding to no or mild anxiety (P=0.001).

Conclusion: Our study demonstrated that a secure text messaging platform is effective for the management of patients with depression or anxiety. Patients who seek mental health care for depression and anxiety using a secure text Chat function can achieve positive mental health outcomes.

Association of COVID-19 Stress With Behavioral Health Force Worker Burnout

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Background: The COVID-19 pandemic required a rapid workplace restructure. Frontline behavioral health workers bore the brunt of COVID-19 challenges. Forced to balance higher demands for behavioral health care despite facing many pandemic-related stressors, behavioral health care providers faced staffing shortages, turnover, and higher worker burnout.

Methods: We conducted an online survey of over 400 behavioral health care providers in Connecticut in November 2021. The survey assessed COVID-19 stressors, perceptions of pandemic impact, burnout symptoms, details about service delivery practices (including telehealth), and demographics.

Results: Mean COVID-19 stress appraisal was significantly elevated for workers of color compared with white workers (P<0.01). COVID-19 stress appraisal was highly correlated with worker burnout (r=0.38). Controlling for age and race/ethnicity, stress appraisal remained a significant predictor of burnout (β: 0.35; P<0.001). Age was a significant negative predictor of burnout.

Conclusion: Pandemic stress had a significant impact on the behavioral health workforce and was felt more acutely by workers of color. Efforts to enhance behavior health worker retention will require programs and interventions directly addressing COVID-19 stress and its persistent psychological sequelae.

RESEARCH METHODS

Principles, Partnership Drive Development of Equitable Community Advisory Council to Inform and Shape Research

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Background: Following widespread reckoning on racial injustice in 2020, HealthPartners Institute sought to create authentic, transparent, and equitable collaboration with community members through a community advisory council. Learning from other models, including within HCSRN, we identified characteristics of successful efforts, principles of engagement, and funding approaches. Key principles include
collaborative partnership, compensation for community members, and ongoing leadership support.

**Methods:** To avoid episodic, grant-specific engagement, we obtained internal funds, including partnering with the health plan, which had compatible needs. We recruited an experienced community leader as co-chair to guide the council and co-create shared cultural norms. Together we developed an equitable strategy to seek nominations through internal and external networks. A diverse pool of candidates was identified, and all 11 selected candidates accepted our invitation.

**Results:** The council first met in May and demonstrates deep engagement and willingness to challenge ideas and offer insights informed by their experiences. Our accomplishments include co-creation of a charter; council contributions to a key community issue; feedback on health equity accreditation goals and a research proposal; and new and effective partnerships in HealthPartners.

**Conclusion:** Thoughtful planning allowed us to launch a mutually rewarding partnership with a diverse council membership to strengthen our work and better represent our community.

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**A Narrative Review of Methods to Improve Race and Ethnicity Data Capture for the FDA’s Sentinel Database**

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**Background:** The U.S. Food and Drug Administration (FDA) Sentinel System includes a large multisite database of U.S. health insurance claims and electronic health record data, spanning 2000 to present. Administrators sought to improve race and ethnicity data capture for improved pharmacoepidemiology studies.

**Methods:** We conducted a narrative literature review with an iterative search of PubMed and Google Scholar. We reviewed published research on data augmentation and imputation methods to improve race and ethnicity capture in U.S. health systems databases. We focused on methods to link data with only 5-digit zip codes to external sources of self-reported data and methods that had patient identifiers available, including full address and complete name.

**Results:** Important themes were 1) variation in data capture of self-reported data, 2) data augmentation from external sources of self-reported data, and 3) imputation methods including Bayesian analysis and multiple regression. Researchers were able to reduce data missingness with high validity for White, Black, and Asian and Pacific Islander racial groups as well as for Hispanic ethnicity. Native American and multiracial groups were difficult to validate due to relatively small sample sizes.

**Conclusion:** Limitations on accessible self-reported data for validation will dictate methods to improve race and ethnicity data capture. We recommend methods that use multiple sources that account for variation in geography, age, and sex.

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**Applying Clinical Decision Support to Improve Recommendation of Low-Dose Aspirin Use in Patients at Risk of Preeclampsia**

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**Background:** Low-dose aspirin (LDA) reduces preeclampsia incidence in high-risk pregnant persons (HRPP). LDA was recommended to only 60% of eligible HRPP at our institution. For this project, a randomized controlled trial was designed aimed at increasing health care providers’ recommendations for LDA use to eligible HRPP.

**Methods:** We interviewed health care providers to inform design of an electronic health record (EHR)-based best practice alert (BPA) to facilitate easy implementation of guideline-directed treatment; this includes over-the-counter e-prescription, utilizing EHR to automatically identify HRPP, and applying patient-level randomization to maximize statistical power and enable causal inference. We applied clinical decision support tools and behavioral science “nudge” principles. If the BPA is activated, the health care provider will be directed within the EHR to recommend and prescribe LDA. The control group will receive standard care. Randomization of 1144 women in a 1:1 fashion to intervention versus control will allow us to detect a 10% absolute difference in LDA recommendation.

**Results:** The primary outcome is rate of LDA recommendation in HRPP. Secondary outcomes include compliance with LDA use and incidence of preeclampsia.

**Conclusion:** This randomization will allow determination of whether a clinical decision support intervention increases recommendation of aspirin via documentation of an over-the-counter prescription.

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**Should I Stay, or Should I Go? Results, Engagement, and End-of-Trial Decision-Making**

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**Background:** Pragmatic trial investigators often face a gap between the conclusion of study intervention delivery and availability of results and must decide about maintaining or discontinuing study interventions. We identify and classify issues to be considered when making that decision.

**Methods:** In August 2022, the NIH Health Care Systems (HCS) Research Collaboratory’s Interactions Core convened 6 principal investigators of active pragmatic clinic trials to explore decisions about maintaining or discontinuing interventions as studies end. Meeting notes were thematically analyzed to surface dimensions and questions investigators should consider.
**Results:** We identified 6 dimensions of maintenance vs discontinuation: 1) ethical; 2) relational/political; 3) timing; 4) intervention-specific; 5) resources; and 6) trial design. Questions to be addressed include: How could maintaining or discontinuing intervention activities affect participants’ care? How important is engagement with health system partners while awaiting results? How soon could investigators assess intervention outcomes? To what degree have clinical staff adopted the intervention? What resources are required to maintain intervention activities? Have intervention practices been confined to only some patients or clinical settings, or spread?

**Conclusion:** While examining additional cases may reveal new dimensions, investigators should consider these identified dimensions during trial planning.

**Evaluation of Education- and Donation-Based Interventions in Diarrhea, Tuberculosis, Malaria, and HIV in the CEMAC Region: A Systematic Review**

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**Background:** Since 1960, $600 billion has been spent on health aid in sub-Saharan Africa. Aid may involve donating goods or providing training, but these broad intervention categories have not been compared in the literature. This systematic review compares foreign donation and education interventions around malaria, tuberculosis (TB), diarrhea, and HIV-related outcomes in the Central African Economic and Monetary Community (CEMAC) region.

**Methods:** A literature search for disease-centered interventions (1990–2020) was conducted. Studies were grouped by intervention and categorized as education or donation. Points were assigned based on outcome (odds ratio, relative risk, etc) from -1 (negative impact), 0 (no impact), 1 (10%–20% improvement), 2 (20%–50%), and 3 (>50%). A mean score was calculated for each intervention and education vs donation interventions. A t-test was run to evaluate the difference in means.

**Results:** Of 844 studies screened, 33 studies (10 education, 11 donation) were included. High-scoring interventions included net distribution (2.67) and teaching HIV test strategies (3). Distribution of free TB medication (0) and 1-day training on use of malaria rapid tests (0) scored poorly. T-test revealed no significant difference between mean scores for education (1.24) and donation (1.21) interventions (P=0.93).

**Conclusion:** The studies show promising strategies for combating disease in the CEMAC region involving both education and donation. Currently unpublished data collected by nongovernmental organizations may clarify the effectiveness of these strategies.

**Understanding Preferences to Share Social Needs**

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**Background:** Social determinants of health impact health, well-being, and quality of life. Addressing patients’ social needs within health care is key to improving health outcomes and reducing health disparities. There is much to learn about what influences patient preferences for sharing their social needs. Influential factors may differ by patient demographics, discomfort with technology used in surveying, or distrust of how the information will be used.

**Methods:** To address the gap in understanding preferences, a mixed-methods study was implemented in a large health system that serves a diverse population. Two weeks prior to an annual wellness exam, patients were sent an email that invited them to complete a survey that asked about their preferred methods to share this information and why. Options included: by email, by mail, at check in, or asked by a nurse/medical assistant or a provider. If no response was received, patients were sent the survey by mail. Interviews also were conducted with key leaders and community service providers to provide an in-depth investigation of factors that might influence someone’s willingness to share their social health needs. Patients with scheduled wellness exams were identified for recruitment. Responses were analyzed by demographics and presented to key informants to aid in the interviews.

**Results:** Preferences differ widely.

**Conclusion:** Findings may be helpful when considering outreach strategies to collect social health needs in the medical record.

**Efforts to Improve Recruitment of Children in Research in Response to the COVID-19 Pandemic**

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**Background:** The COVID-19 pandemic amplified the challenges of recruiting children in health research studies. We recruited children 7–11 years of age and their parents to participate in research about the child’s behavior and brain function. Prior to COVID-19, recruitment was done using paper mail and phone calls, and the number of children recruited was favorable. To mitigate the slow recruitment numbers in 2021, all paper mails were replaced with email, and an engagement survey was added to the email.

**Methods:** We performed a preliminary comparison of recruitment strategies by comparing recruitment numbers. Recruitment efforts were recorded using REDCap database. The number of subjects recruited were tabulated from February to September for each year prepandemic (2019) and postpandemic (2021 and 2022).

**Results:** Prior to the pandemic, we recruited a total of 40 children. Postpandemic, a total of 22 children were recruited in 2021 and 32 children were recruited in 2022. Preliminary findings show there was a marked reduction in recruitment of children after the study’s hiatus in 2020 because of the COVID-19 pandemic.

**Conclusion:** Replacing paper mailings with email and adding the engagement survey to our recruitment strategy has...
improved our recruitment numbers in 2022, as compared to 2021. However, recruitment numbers remain less favorable than prior to the COVID-19 pandemic. The next step will be to explore specific barriers and disparities to participation to optimize recruitment in research.

A Public Data Visualization Tool for Electronic Health Records Data to Support Community Health: The Kaiser Permanente/RAND Heart Disease Data Portal

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Background: Electronic health records (EHR) data from large health systems can support targeting of interventions and advocacy efforts of local public health departments and community organizations. The Kaiser Permanente Southern California (KPSC)/RAND Corporation Heart Disease Data Portal (HDDP) is a public facing, interactive, mapping portal that allows for safe sharing of de-identified, aggregated hypertension prevalence for 26 health districts in Los Angeles County (https://www.kp-scalresearch.org/heart-disease-mapping-portal/).

Methods: We use KPSC EHR data from 2010 to 2019 to calculate hypertension prevalence following Healthcare Effectiveness Information Sets (HEDIS) criteria. Estimates too small to release based on federal and state guidelines were deleted. The mapping portal was created in R-Shiny and is hosted on a firewalled server outside of the central KPSC network. The HDDP can be augmented with other health outcomes in the future.

Results: Users can select combinations of broad age groups, race/ethnicity, and sex. Hypertension prevalence is displayed by year or as a map movie across years. Time series plots allow comparison of trends across health districts. Detailed technical documentation, including the R-shiny code, are shared on our webpage to allow other health systems to reproduce our approach.

Conclusion: The HDDP mapping portal can support public health organizations by providing local, up-to-date, and high-quality data for disease prevention and advocacy.

A Regional Analysis of Hospital-Reported Prices to Understand Pricing Strategies for Different Service Types

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Background: Hospitals may use different pricing strategies for services expected to have little variation in performance and outcomes (undifferentiated) and those with more variation (differentiated). This study aimed to assess the relationship among regional hospital-reported list, cash, Medicare, and negotiated commercial prices for differentiated and undifferentiated services.

Methods: Observational cross-sectional analysis of wage index-adjusted hospital prices for 14 common services (5 differentiated, 9 undifferentiated) from 2386 acute general hospitals in 1561 of 3436 hospital service areas in 2022. Prices were log-transformed and correlated.

Results: Both differentiated and undifferentiated services exhibited high variation across payer types. For differentiated services, all prices were highly correlated with each other (r>0.9). For undifferentiated services, all prices were correlated (r=0.7–0.9), though correlations with Medicare prices were weaker. List and cash prices exhibited the strongest correlation for both service types.

Conclusion: All hospital prices were highly correlated with each other, particularly for differentiated services. The high correlations with list price suggest common use of pricing strategies that use list price as a reference for commercial and cash prices. These strategies may have important implications for patient out-of-pocket hospital costs, especially for self-pay patients.

Are Current Social Health Screening Measures Underidentifying At-Risk Adults?

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Background: Estimates of social risks will vary based on questions used to assess risk.

Methods: Weighted data for 2869 Kaiser Permanente Northern California non-Medicaid members, 35–85 years of age, who responded to a 2021 mailed/online social risk survey were analyzed to compare prevalence estimates for financial strain, food insecurity, and housing insecurity based on different combinations of questions. All questions used a 3-month lookback.

Results: 3.1% of adults found it hard and 17.0% somewhat hard to pay for the “very basics;” 7.6% lacked enough money and 18.8% had just enough money to “make ends meet;” and 14.5% had trouble paying for ≥1 of 10 expense types. Based on these 3 questions plus foregoing medical/dental needs due to cost, 25.7% of adults had financial strain (32.7% if “somewhat hard to pay” included). Prevalence of food insecurity was 6.8% based on “often worried food would run out,” “food ran out before had money to buy more,” and/or “trouble paying for food,” but 12.1% when “food bank use” was included. Prevalence of housing insecurity was 6.8% based on “trouble paying for housing,” rising to 12.0% when “worries about ability to pay for housing” and “losing housing” were included.

Conclusion: Adults with financial, food, and housing insecurity may be missed using current narrowly focused screening questions. “Making ends meet” may better identify financial strain than difficulty paying for “basics,” and housing insecurity screening should also cover worry about future housing security.
Automation of Tumor Registry Follow-Up Activity

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Background: According to the National Cancer Registrar Association (NCRA), tumor registries with approximately 3500 new cases annually spend an estimated 55 hours per week, or 1.6 full-time employees, on follow-up activities that are time-consuming and affect registry productivity. The Kaiser Permanente Mid-Atlantic States (KPMAS) Tumor Registry has automated its patient follow-up activities to maintain updated data.

Methods: The KPMAS Tumor Registry’s automation process first identifies patients who have no follow-up within 15 months by checking their date of last contact. A patient’s last contact date is identified in the Virtual Data Warehouse (VDW) from patient vitals, physician encounters, and lab appointments. It is then fed into the tumor registry software by the automation process. For a deceased patient, the date of death is used as the date of last contact, and their vital status is updated accordingly.

Results: The automation process took approximately 40 hours to develop and requires minimal time for maintenance. It has helped the KPMAS Tumor Registry maintain a high patient follow-up rate. As of May 2022, KPMAS has maintained a follow-up rate of 92%, out of 13,000 patients.

Conclusion: The developed automation process has successfully improved patient follow-up care, with reduced manual time and effort. Future work includes automatically linking synoptic pathology reports to tumor registry data to resolve our limitations in updating a patient’s cancer status.

Clinical Circumstances Underlying Gaps in Dispensing

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Background: Accurately identifying drug discontinuations in electronic health records is important for developing evidence about deprescribing. Gaps in dispensing are often used as proxies for discontinuations, but clinical circumstances associated with dispensing gaps are not well described. Inaccurate estimates of discontinuations may bias study results.

Methods: We identified a retrospective cohort of patients who experienced a 90-day gap in dispensing for oral diabetes drugs, statins, proton pump inhibitors, drugs with anticholinergic effects, anticoagulants, antiplatelets, and antihypertensives. Approximately 50% had no further refills after the gap. Chart reviewers classified dispensing gaps as true discontinuations (clinically intended) and nondiscontinuations (no evidence of intent to discontinue) and further described clinical circumstances associated with gaps in dispensing in each category.

Results: Of 1198 records, 661 (55%) reflected true discontinuations. This included provider intent to discontinue, provider substitutions, intentional stops/restarts, and agreeing with a colleague’s or patient’s decision to discontinue. Nondiscontinuations included low adherence, dose changes, and formulary changes. True discontinuations were more common when a gap was not followed by subsequent fills.

Conclusion: Gaps in dispensing may overestimate medication discontinuations. Understanding circumstances associated with dispensing gaps can inform development of data-based methods to identify discontinuations within electronic health records.

Engaging a Study Advisory Committee to Drive Study Design and Implementation Change: Case Study of a Palliative Care Trial

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Tibor Rubin Long Beach Veteran Affairs, Long Beach, CA; American Cancer Society, Atlanta, GA; Charles R. Drew University of Medicine and Science, Willowbrook, CA; Lillie’s Circle of Care, Streamwood, IL; University of Florida Shands Hospital, Gainesville, FL; The Phoenix Group Foundation, Centralia, IL; Center for Education & Professional Development, Stanford Health Care, Palo Alto, CA; The Blackstone Group, New York, NY; Hospice and Palliative Nurses Association, Carnegie, PA; patient advocacy, Washington, DC; New York University Grossman School of Medicine, New York, NY; Memorial Sloan Kettering Cancer Center, New York, NY

Background: Challenges in recruitment and retention of older adults in palliative care research can be difficult to overcome. Study advisory committees (SACs) involve patients, community organizations, payors and other stakeholders to assist researchers in designing and implementing studies. Stakeholder involvement enhances research quality, efficiency, transparency, relevance, and facilitates dissemination of results. While beneficial, gaps continue to exist in describing the value and impact of SAC engagement.

Methods: We conducted a retrospective descriptive case study using qualitative methods to understand perceived benefits of the SAC recommendations for the implementation of the Emergency Medicine Palliative Care Access (EMPallA) pragmatic, multicenter randomized controlled trial. EMPallA compares nurse-led telephonic case management and specialty outpatient palliative care.

Results: A total of 16 SAC meetings occurred from December 1, 2017, to November 30, 2020. The SAC includes 18 members. The SAC provided 41 recommendations resulting in 26 distinct study modifications. The majority of recommendations were
related to protection of human subjects. The SAC advocated for cultural competence, protection, and safety of this vulnerable study population (developing large font materials, advocating for disseminating hearing aids for telephonic surveys, etc). Conclusion: SAC member contributions have strengthened the overall study by ensuring the research maintains a patient-centered approach.

Identifying Patient Factors in the Utilization of Skilled Nursing Facilities as a Bridge to Increase Poststroke Acute Rehabilitation Admissions

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Background: Rehabilitation after hospital discharge is an essential component of stroke recovery. However, many patients with stroke are not immediately ready for an inpatient rehabilitation facility (IRF) after hospital discharge. This study demonstrates that skilled nursing facilities (SNF) can improve the number of IRF admissions and seeks to understand patient factors that allow transfer from a SNF to IRF.

Methods: We included subjects with a primary diagnosis of ischemic stroke, subarachnoid hemorrhage, or intracerebral hemorrhage who were discharged to a SNF from January 2015 to December 2021. Demographics including gender, race, age, and risk factors were abstracted. We used Wilcoxon rank-sum and chi-squared tests to analyze the data.

Results: A total of 1120 subjects were discharged to a SNF, of which 173 (15%) between 2015 and 2021 (range: 9% to 19%, standard deviation [SD]: 3) received an IRF referral after SNF discharge. Patients with an IRF referral were younger (mean: 61.90 years [SD: 14.05] vs mean: 73.09 years [SD: 12.12]; P<0.0001) and were more frequently men (20% vs 11%; P<0.0001). There were no significant differences in length of stay, discharge modified Rankin Score, referral patterns by race, and prevalence of hypertension, diabetes mellitus, coronary artery disease, dyslipidemia, heart failure, or smoking.

Conclusion: SNFs are an effective bridge between the hospital and IRF and should be considered as an alternate poststroke route for patients who are not immediately ready for IRFs after the hospital but may still benefit from IRF therapy.

Is There a Relationship Between Community Characteristics and Hospital Prices? A Regional Analysis of Hospital-Reported Prices for 14 Common Services

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Background: The Centers for Medicare & Medicaid Services and other health care payers are increasingly interested in accounting for community characteristics in value-based payments to appropriately compensate providers for caring for socially at-risk patients while still controlling costs. This study aimed to assess the associations between regional hospital-reported prices and community characteristics.

Methods: Observational cross-sectional analysis of wage index-adjusted hospital-reported prices for 5 differentiated and 9 undifferentiated services from 2386 acute general hospitals in 1561 of 3436 hospital service areas in 2022 was performed. Community characteristics included the social deprivation index and measures of poverty, employment, insurance, and education.

Results: List prices were correlated with the most community characteristics (10 of 16, 63%) followed by cash prices (44%) and commercial (31%). Medicare and Medicaid prices were each correlated with 1 measure. All price types were significantly correlated with the percentage of uninsured. Correlations between price types and other characteristics varied by price type (range: -0.18 to 0.30).

Conclusion: Correlations were weak, suggesting that community characteristics were small contributors to the prices. List prices were correlated with the most measured community factors, while Medicaid and Medicare prices were correlated with the least community factors. Notably, hospitals in less than half of the hospital service areas reported prices.

Natural Language Processing for Measuring Colonoscopy Quality

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Background: Adenoma detection rate (ADR) is an important quality metric of colonoscopy and tied to interval colon cancer incidence. However, tracking and reporting ADR is resource-intensive and requires reconciliation of unstructured polyp pathology with colonoscopy reports. Herein, we report a natural language processing (NLP) method to identify polyp information.

Methods: We developed an NLP algorithm using regular expression to extract colon polyp data from free-text pathology reports. Of the 70,399 colonoscopy pathology reports collected at an integrated health system in Northern California between 2003 and 2020, a random sample of 1000 reports were selected to test the result from NLP compared to chart view (ie, gold standard). Outcomes evaluated were: 1) whether any adenoma appeared in the report; and (2) what adenoma subtype was indicated (tubular, tubulovillous, villous). Cohen’s kappa statistic was used to assess the accuracy of the NLP-generated results.

Results: The observed proportion of agreement between NLP and chart review was 98.0% (κ: 0.959) for the overall adenoma. Agreements varied by adenoma subtypes (97.7%, κ: 0.953 for tubular; 99.7%, κ: 0.917 for tubulovillous; 99.6%, κ: 0.798
Prediciting 1-Year Mortality Among Patients With Heart Failure: Model Development and Validation

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Background: Heart failure is a chronic condition with high mortality. Mortality risk-based management is approved to be effective, but several challenges hinder translating risk predictive models to clinical practice, including inadequate model performance and limited accessible features. In this study, we selected the MARKER-HF model, published by University of California, San Diego (UCSD), which has performed well using commonly available lab variables and had been externally validated. The objective is to develop a Sutter-customized model with MARKER-HF features and compare to the original MARKER-HF and another two algorithms.

Methods: The original MARKER-HF applied gradient boosting machines (GBM) to 8 features. We identified 46,492 patients with heart failure between January 1, 2010, and August 31, 2021, trained Sutter-customized GBM, and estimated area under curve (AUC) using cross-validation. We also trained logistic regression and random forest and compared AUC between all models. We repeated this process to a subgroup of 8471 patients with heart failure and reduced ejection fraction (HFrEF).

Results: Among patients with heart failure, the customized MARKER-HF yielded an AUC of 74.6, better than logistic regression (74.1%), random forest (72.2%), and the original UCSD MARKER-HF (71.8%). Patients with HFrEF yielded AUC as high as 82.5%, followed by logistic regression and random forest.

Conclusion: UCSD’s original MARKER-HF showed good cross-population model performance. Clinical translation of MARKER-HF may consider customizing the model to boost model performance without losing generalizability.

Prevalence of Social Risks, Social Needs, and Receptivity to Screening in an Integrated Health Care Delivery System 1 Year Into the COVID-19 Pandemic

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Background: Data about racial and age group differences in social risks, needs, and attitudes toward screening in non-highly vulnerable adult populations is limited.

Methods: We analyzed data for 2869 Kaiser Permanente Northern California (KPNC) non-Medicaid members, 35–85 years of age, who responded to a 2021 mailed/online survey. The survey covered 7 social risk and 11 social needs domains as well as attitude toward screening. We used data weighted to the KPNC membership to estimate prevalence of risks, needs, and screening receptivity in the overall population, by race (White, Black, Latino, Asian/PI), and by age group (35–65 and 66–85 years). Logistic regression was used to assess differences between groups.

Results: Overall, 26% of adults were financially strained, 12% food insecure, 12% housing insecure, 5% transportation insecure, and 7%, 8%, and 17% had difficulty paying for utilities, medical expenses, and dental care, respectively. More than 40% wanted help with ≥1 need, with dental care, vision/hearing care, paying for medical expenses and utilities, and managing debt repayment, topping food, housing, and transportation. Prevalence of social risks and needs was generally higher among middle-aged adults and Black and Latino (vs White) adults. Among 70% of adults okay with being screened, 85% were willing to complete a questionnaire and 40% to have staff ask questions.

Conclusion: The prevalence of social risks and social needs and receptivity to social health screening will vary based on population demographics.

Should Random Subject Effects Be Included in Predictive Models?

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Background: Generalized linear mixed-effects models (GLMM) are often used to analyze data with repeated measures of binary outcomes. However, when developing predictive models for use in clinical operational settings, should random subject effects be considered in the model?

Methods: We developed a clinical predictive model to identify members at high risk of missed colonoscopy appointments at Kaiser Permanente Colorado. Since many members had multiple colonoscopy appointments, we used GLMM with random person effects to account for correlated observations on the same member. We compared discrimination (c-statistic) and calibration of GLMM to a traditional logistic regression model.

Results: Of 77,684 appointments, 3237 (4.2%) were missed. The c-statistics were comparable between GLMM and logistic regression: 0.75 (95% CI: 0.74– 0.76); they differed only in the third decimal point. The calibration plots were similar and showed good agreement between observed and predicted risk.

Conclusion: The advantage of GLMM is that it can model correlated outcomes via random effects. However, one problem of implementing GLMM in a clinical operational setting was that the random effects were “unknown” for new members, thus only fixed effects could be used in the risk calculation. Although
the performance of GLMM and logistic regression were comparable in our study, whether and how to include random effects in predictive models designed for clinical operational purposes should be evaluated based on the anticipated uses of the model.

**Strategies and Challenges Identifying Emergency Departments Within the Centers for Medicare & Medicaid Services Data Warehouse**

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**Background:** Researchers utilize data from the Centers for Medicare & Medicaid Services (CMS) Data Warehouse. Identifying claims within emergency departments (EDs) can be challenging when health systems bill in a consolidated fashion with other hospitals or freestanding EDs.

**Methods:** We accessed Medicare claims records through CMS’s Chronic Conditions Data Warehouse in 35 EDs across 18 health systems in the United States from January 1, 2013, to December 31, 2020. These EDs were part of a national stepped-wedge cluster-randomized trial called PRIM-ER.

**Results:** In addition to the traditional method of using the CMS Certification Number to identify hospitals, we generated two additional strategies to more accurately identify ED patient claim data. Strategy 1: Across all EDs in our sample, we examined the unique combinations of each ED and 9-digit billing claim zip code. When not successful, Strategy 2 was implemented, whereby we matched physician claims with ED facility claims and extracted the list of physician National Provider Identifiers. We engaged key personnel at each health system to identify the specific ED location with which a provider was primarily associated.

**Conclusion:** Using a combination of two strategies increased confidence that our patient claims were correctly associated with one of our EDs. Sharing these strategies would be beneficial to other researchers working with CMS data and encounter similar ED identification issues.

**Systematic Management of Medical Codes and Terminology in the Virtual Data Warehouse**

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**Background:** Standard codes have been leveraged by researchers who wanted to use medical billing data in their studies; by creating managed data warehouses (HCSRN Virtual Data Warehouse [VDW], i2b2, OMOP, etc), standard medical codes have enabled researchers to create common data models. However, the codes are not intuitively associated with their clinical terminology and different organizations will use different standard code sets in their electronic health records.

**Methods:** We leveraged the Observational Health Data Sciences and Informatics OMOP Vocabulary to build a VDW-centric code management system we call RCM (Research Code Management). These tables allow us to transform between different standard code sets and traverse the groupings of codes so that different hierarchies between code sets can more easily be identified. Identifying similar groups greatly reduces the search space when using natural language processing to generate suggestions for better code matches.

**Results:** The RCM serves as an integral part of a prep-to-research tool in which investigators can use medical terminology to identify the number of procedures, diagnoses, or medications received and the number of patients in various cohorts. RCM also has empowered our programmers to quickly provide investigators with lists of candidate codes for them to use in defining the cohorts for their study and many other uses.

**Conclusion:** Our presentation will demonstrate the RCM model and the source code for members to go build their own RCM.

**The Power to Prevent Cancer: Leveraging Health Care Organization Data and Membership to Build a Comprehensive Research Cohort**

Mark Schmidt, Habib Ahsan, Brisa Aschebrook-Kilfoy, Heather Spencer Feigelson, Chun-Hung Chan, Jennifer C. Gander, Robert T. Greenlee, Stacey Honda, Pamala A. Pawloski, Benjamin Rybicki, Mia Gaudet

Kaiser Permanente Northwest, Portland, OR; University of Chicago Medical Center, Chicago, IL; Kaiser Permanente Colorado, Aurora, CO; Sanford Health, Sioux Falls, SD; Kaiser Permanente Georgia, Atlanta, GA; Marshfield Clinic Health System, Marshfield, WI; Kaiser Permanente Hawaii, Honolulu, HI; Hawaii Permanente Medical Group, Honolulu, HI; HealthPartners, Minneapolis, MN; Henry Ford Health, Detroit, MI; National Cancer Institute, Bethesda, MD

**Background:** The National Cancer Institute, along with 9 partner health care organizations, launched the Connect for Cancer Prevention Study (Connect) in July 2021. The goal of Connect is to build a prospective, longitudinal cohort of over 200,000 adults, 40–65 years of age with no prior history of cancer, to allow for broad research into a wide range of factors leading to cancer development and diagnosis.

**Methods:** Participants are asked to complete a survey and submit blood, urine, and saliva specimens upon enrollment and are compensated for their participation. Additional survey, electronic health record, biospecimens, tissue specimens, and novel digital data (ie, from health tracking apps and wearables) will be collected over the course of the study, expected to last for decades.

**Results:** As of October 12, 2022, we have enrolled 3114 (3.8%) of 80,588 invited individuals. Of enrolled members, 57.6% completed all 4 baseline survey modules and 18.5% submitted enrollment biospecimens. With rapidly changing numbers,
we will describe up-to-date recruitment results and highlight successes and challenges as we implement this project across the consortium.

**Conclusion:** Our findings demonstrate the achievement of several milestones toward the goal of Connect. Future work, including the integration of electronic health record and novel data streams, will increase the salience and prominence of this research cohort within the scientific community. As such, Connect exemplifies the power of internal and external collaborations across HCSRN.

**Theory-Informed Study Recruitment and Retention**

Jeanette Y. Ziegenfuss, Elana Sour, Maren Henderson, Rachael Rivard, Erin Schwartz, Elizabeth Grossman, Pamala A. Pawloski

**HealthPartners Institute, Bloomington, MN**

**Background:** The All of Us Research Program is partnering with health systems to create a diverse cohort of more than 1 million U.S. adults to share health information and other data.

**Methods:** Utilizing the COM-B model of behavior change helps one partner site understand the capability, opportunity, and motivation of potential recruits at different points in recruitment and retention to identify tailored strategies to increase participation. At this site, over 16,500 have been invited. Recruitment is ongoing and will exceed 20,000 participants at this site. Invitees are described by sociodemographics and health status mapped to COM-B. Contact, refusal, and participation rates are reported. Individuals’ comments are coded into the model and together inform potential drivers within capability, opportunity, and motivation in study participation.

**Results:** Thus far, 5% (n=798) of invitees register. A subset (n=707) have consented and scheduled study visits (n=599); fewer have completed study surveys. Recruitment and rates of participation in sequela vary by individual characteristics impacting capability, opportunity, and motivation. Qualitative data informs additional important factors in these domains.

**Conclusion:** Using this model enables identification of factors to modify to increase study participation among individuals with diverse backgrounds across myriad domains.

**Assessing Patients’ Experiences and Preferences on Social Needs and How to Receive Support From an Integrated Health Care Delivery System**

Dea Papajorgji-Taylor, Clarissa Hsu, Arvind Ramaprasan, David Mosen

**Center for Health Research, Kaiser Permanente Northwest, Portland, OR; Kaiser Permanente Washington Health Research Institute, Seattle, WA**

**Background:** In 2020, Kaiser Permanente administered the Social Health Survey to members across its 8 regions. The survey covers a variety of topics, including overall health, housing, food, isolation, and financial challenges, and 10,274 participants responded. In June 2022, the same cohort was asked to retake the survey. Results will inform Kaiser Permanente’s efforts in assisting members with social needs and identify additional methods for administering support.

**Methods:** To explore critical questions emergent from the quantitative findings, qualitative interviews will illustrate patient stories and uncover additional insights about social health integration. A database was developed to identify members by key patient domains of interest (eg, race/ethnicity, line of business). Members received an email invitation to complete the one-time, 30-minute phone interview. The interview guide includes the following domains: exploring members’ both resolved and unresolved needs, acceptability of the health system providing assistance on social needs, and barriers and facilitators to accessing resources.

**Results:** We aim to conduct 48 interviews with purposeful selection of members to ensure representation across the identified domains — 24 members with resolved needs and 24 members with persistent needs.

**Conclusion:** Findings will provide new insight into how social needs impact health, how Kaiser Permanente can help to better address their needs, and the barriers and facilitators to resolving social needs.

**Improving Mixed-Methods Research Using Advisory Boards**

Kanetha Wilson, Marsha Wright, Issmatu Barrie, Jennifer Heliste, Michelle Henninger, Courtney McCracken, Nancy Weinfeld, Teaniee Davis

**Kaiser Permanente Georgia, Atlanta, GA; Kaiser Permanente Mid-Atlantic States, Rockville, MD**

**Background:** Nationally, vaccination rates vary across racial and ethnic groups, creating health inequities. A mixed-methods study design is one approach to understand disparities in vaccination rates. Engaging member perspectives can improve study processes.

**Methods:** Kaiser Permanente Georgia and Kaiser Permanente Mid-Atlantic States convened an advisory board (AB) of 7 adult members who were willing to discuss their experiences and perspectives on vaccines. AB members agreed to 3 1-hour meetings over an 18-month period. AB members were tasked with 1) providing input on survey and interview guides, 2) discussing preliminary findings, and 3) providing feedback on dissemination plans. AB members participated in pilot interviews to help prepare staff for conducting interviews.

**Results:** In July 2022, AB members gave feedback on an interview guide, including changing words, removing redundant items, rephrasing questions, and shortening sections of the guide. In October 2022, 4 AB members participated in pilot interviews as part of interview training. The qualitative lead reviewed the pilot interviews and worked with interviewers to discuss techniques and opportunities for adjustment.

**Conclusion:** Engaging AB members during the study process can improve data collection, team members’ preparedness, and
dissemination plan for results. AB members provide patient perspectives outside the lived experiences of researchers and should be incorporated into future research aimed at promoting health equity.

**POSTER PRESENTATIONS**

**AGING**

**A Review of the Literature and Publicly Available Data on Medical Aid in Dying in the United States**

Geoffrey Kahn, Tessa Hampton, Elyse Llamocca, Jordan Gootee

*Henry Ford Health, Detroit, MI*

**Background:** Medical aid in dying (MAiD, aka physician-assisted suicide) is the practice of prescribing qualifying, terminally ill patients a lethal dose of medication for them to self-administer at a time and place of their choosing. It was first legalized in Oregon in 1998. Since then, 9 other states and Washington, DC, have legalized MAiD, 7 of these since 2015. Seven states make select aggregate statistics on MAiD cases publicly available. Collecting information at the individual level is challenging since MAiD deaths are not recorded as such in the medical record, and both patients and providers have justifiable concerns about privacy.

**Methods:** We conducted both a scoping review of the scientific literature on MAiD in the United States and a descriptive analysis of all publicly available state-specific MAiD data.

**Results:** We found 255 articles published between January 1998 and August 2022 that included original data; 64% of these surveyed health care providers, patients, and the general public about their support for MAiD, with some examining correlates of support. Most quantitative studies relied on publicly available data and almost all were limited to data from Oregon and Washington, the states with the oldest history of legal MAiD. There is substantial heterogeneity in the way that states collect and report data. MAiD mortality rates vary between states, and while all states show an increase in MAiD use over time, the magnitude of change varies. Cancer is the underlying illness in 63%–75% of MAiD cases.

**Conclusion:** Heterogeneity of state-level data and a paucity of recent, individual-level data make it difficult to study MAiD. Given the accelerating trend toward legalization, it is crucial that health systems find ways to study the impacts and best practices of this increasing access to MAiD.

**Examining the Association of Social Needs With Future Health Care Utilization Among an Elderly Population**

David Mosen, Matthew P. Banegas, John Dickerson, Erin Keast

**Background:** Social needs may be associated with future health care utilization, despite limited research. This study examined the association of social needs with future health care utilization.

**Methods:** This observational study included 8625 Kaiser Permanente Northwest members on Medicare who completed the Medicare Total Health Assessment (MTHA) quality improvement survey between December 4, 2019, and November 30, 2021. The MTHA assessed 4 social needs, defined as binary measures (yes/no): 1) financial strain; 2) housing needs; 3) food insecurity; and 4) transportation needs. Hospitalization (yes/no) and emergency department utilization (yes/no), our outcome measures, were measured in the 12 months after MTHA. Multivariable logistic regression analysis assessed the association of count of social needs (0 vs 1, 2, and ≥3 needs) with outcome measures.

**Results:** Higher social needs count was associated with higher health care utilization. Specifically, compared to those with no needs, those with 2 needs (odds ratio [OR]: 2.00, 95% CI: 1.58–2.53) and ≥3 needs (OR: 1.73, 95% CI: 1.22–2.47) were more likely to have emergency department utilization; while those with 2 needs (OR: 1.62, 95% CI: 1.17–2.24) and ≥3 needs (OR: 1.80, 95% CI: 1.15–2.82) were more likely to have any hospitalization.

**Conclusion:** Findings suggest social needs are associated with health care utilization. Future research is needed to understand whether addressing social needs in the health care setting may reduce future health care utilization.

**Using Journey Mapping to Understand the Experiences of Caregivers of People Living With Dementia**

Tobie McPhail, Kathy Gleason, Courtney Kraus, Blythe Dollar, Andrea Daddato, Rebecca Boxer

*Institute for Health Research, Kaiser Permanente Colorado, Aurora, CO*

**Background:** Caregivers for persons living with dementia (PLWD) are frequently spouses. Caregiver hospitalization causes a disruption to caregiving. The research goal was to understand the stress trajectory peri-caregiver hospitalization to better target future interventions.

**Methods:** Journey mapping, a human-centered design, was used to map caregivers’ experiences. We interviewed spousal caregivers (n=18) who were hospitalized in the past 15 months to describe and rate their stress levels on a scale of 0 (not stressed) to 5 (most stressed) at 5 time points: dementia diagnosis (of PLWD), progression of dementia, caregiver health event (change in condition), caregiver hospitalization, and caregiver return home from hospital. Results were pictorially displayed and analyzed for themes and commonalities.

**Results:** Four clusters of caregiver maps emerged. Cluster 1
(n=4) expressed their highest stress during their hospitalization due to concern about their own health and who would serve as backup caregiver. Cluster 2 (n=8) rated their stress lower during hospitalization due to not having to worry about caregiving. Cluster 3 (n=3) reported their stress high both at the time of PLWD progression and during hospitalization. Cluster 4 (n=3) were at a sustained high stress level over all time points.

**Conclusion:** Caregiver stress levels around their own hospitalization is not universal. Meeting the needs of home caregivers perihospitalization should be tailored to the individual caregiver.

### CANCER

**Analyzing Encounter Note Text to Determine Hospice Care Utilization Patterns at End of Life Among Deceased Patients Who Had Advanced Cancer**

Amandeep Mann, Martina Li, Su-Ying Liang, Kevin Hays, Natalia Colocci, Manali Patel, Harold S. Luft, Ellis C. Dillon

Center for Health Systems Research, Sutter Health, Walnut Creek, CA; Palo Alto Medical Foundation Research Institute, Sutter Health, Palo Alto, CA; Palo Alto Medical Foundation, Sutter Health, Palo Alto, CA; Medical Oncology, Stanford University, Palo Alto, CA; Center on Aging, University of Connecticut, Farmington, CT

**Background:** Receipt of hospice care at the end of life is an important quality metric as it may improve quality of life for individuals with serious illnesses. However, since hospice care is typically provided by agencies distinct from our health system, hospice data are not systematically captured within the electronic health record (EHR) system.

**Methods:** We retrieved 7164 EHR encounter notes for 344 patients with advanced cancer treated at a large health system in California and who died between September 2019 and February 2022. The text of their encounter notes was qualitatively analyzed to find and classify documentation of hospice care.

**Results:** Overall, 246 (71.5%) patients had clear documentation of receiving hospice care before death, 50 (14.5%) had clear documentation of not receiving hospice care (eg, patient declined hospice), and 48 (14.0%) had unclear or ambiguous documentation. Of patients with hospice care documented, 69.1% had a documented admission date. These patients were admitted to hospice at a mean of 29.3 days prior to their death (standard deviation: 37.3).

**Conclusion:** Rates of hospice care were high for these patients with advanced cancer. Documentation was labor-intensive to locate, and the quality and completeness of information varied. Routine measurement of this important aspect of patient-centered care would require a consistent approach to capturing hospice data, starting with structured fields in the EHR system.
Identifying Patients on Long-Term Opioid Therapy: An HCSRN Virtual Data Warehouse-Compatible Standard Macro

Arvind Ramaprasan, Ladia Albertson-Junkans

Kaiser Permanente Washington Health Research Institute, Seattle, WA

Background: Opioid prescribing and exposure remain important areas of research within the HCSRN and beyond. In 2019, programmers at Kaiser Permanente Washington Health Research Institute developed and validated an HCSRN Virtual Data Warehouse (VDW)-compatible standard SAS macro for calculating opioid milligram morphine equivalent (MME) to support opioid-related research across the network.

Methods: Since then, the macro has undergone several key enhancements that greatly improve its usability, versatility, and capabilities.

Results: Enhancements include additional parameters that give users the flexibility to define opioid exposure, based on both days supply and average daily MME during a user-defined period, while ensuring the programming approach remains consistent across applications. This flexibility is particularly useful for cohort identification and assessing opioid exposure over time (eg, tapering).

Conclusion: This poster provides an overview of the enhanced SAS macro through the use-case of identifying a cohort on long-term opioid therapy.

The Contribution of Social Needs Factors to Racial Differences in Hypertension

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Background: Studies have attributed gaps in hypertension (HTN) between Black/African American (BAA) and White adults to socioeconomic factors. We quantified the contribution of social needs to racial gaps in HTN in 6 Kaiser Permanente regions.

Methods: Social needs survey data were linked to electronic health records. Exposures included financial strain, food insecurity, and housing instability; the outcome was either HTN diagnosis, HTN medication use, or blood pressures above 140/90 mmHg; strata were self-reported race. Covariates included demographics, insurance, and health measures. Weighted Oaxaca-Blinder models calculated contributions of variables to the racial difference in HTN.

Results: Analyses included 1223 BAA and 3372 White participants. BAA participants had a higher proportion of HTN (52% vs 43% in Whites) and were more likely to be younger, female, have more social needs, and have a greater...
comorbidity burden. Of the 9% gap in HTN between BAA and White participants, the covariates in our Oaxaca-Blinder model explained 38% of the difference. Of this explained difference, financial strain, food insecurity, or housing instability significantly contributed to the racial gap by 11%. Racial gaps in HTN create an undue burden on BAA populations.

**Conclusion:** We found that if levels of social needs in BAA participants were equalized to their White counterparts, the racial gap in HTN could be reduced. However, the impact is relatively small and other social factors such as discrimination will be important to explore.

**An Assessment of Factors From Normalization Process Theory Affecting Health Care Worker Adoption of a Community-Integrated Social Care Intervention**

Anthony Olson, Melissa Harry, Brenna Doheny, Emily Kuenstler, Niall Klyn, Stephen Waring

Essentia Health, Duluth, MN; Essentia Institute of Rural Health, Duluth, MN; University of Minnesota Medical School, Duluth, MN

**Background:** Unmet health-related social needs (HRSN) cause poor health. In March 2021, Essentia Health launched a tool, RESOURCEFUL, for health care workers (HCWs) to address this. RESOURCEFUL is an Epic-linked web platform for finding free/reduced-cost services while streamlining information, communication, and referrals among HCWs; community-based organizations, and patients. However, many innovations fail from low HCW capacity. Normalization process theory (NPT) outlines factors affecting tool adoption. This study describes Essentia’s HCW use or non-use of RESOURCEFUL with patients by NPT factors.

**Methods:** A survey of 937 Essentia HCWs who accessed RESOURCEFUL from March 2021 to May 2022 was conducted. Descriptive statistics of HCW characteristics and RESOURCEFUL utilization (HRSN interference in care, use/ non-use with patients, NPT factors) were reported.

**Results:** Responses were collected from 183 Essenstia HCWs. Only 30% used RESOURCEFUL at least once to help patients, despite 64% indicating unmet HRSN interfered with patient care at least monthly. Six NPT factors had significant differences (P<0.05) between HCWs using or not using RESOURCEFUL to help patients. Half as many HCWs utilized RESOURCEFUL with patients as those where unmet HRSN interfered with care.

**Conclusion:** Responses to NPT items suggest 6 key areas related to RESOURCEFUL adoption by HCWs: 1) perceptions that RESOURCEFUL is not a legitimate part of their job; 2) low awareness of available training for themselves; 3) low awareness of available training for co-workers; 4) low understanding of value to one’s work; 5) low understanding of value to their colleagues’ work; and 6) relevance of RESOURCEFUL utilization feedback. Targeting these areas can mitigate adoption barriers and better address unmet HRSNs of patients.

**Characterizing Community Socioeconomic Conditions Using Area-Level Credit Scores in Pennsylvania: Associations With Type 2 Diabetes Onset**

Melissa Poulsen, Annemarie Hirsch, Jonathan Pollak, Joseph DeWalle, Brian Schwartz

Geisinger Health, Danville, PA; Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

**Background:** Credit scores (CS) reflect socioeconomic position and predict health outcomes. Area-level CS may capture community socioeconomic position and health risks beyond traditional measures of community socioeconomic deprivation (CSD). We evaluated associations of community CS with new-onset type 2 diabetes (T2D) and whether previously established CSD-T2D associations persisted in high CS communities.

**Methods:** Using Geisinger medical records, we conducted a case-control study of 15,888 T2D cases and 79,435 matched controls. Individuals were assigned their community’s mean CS (VantageScore 1.0 range: 600–850) and CSD based on residential address. We used generalized estimating equations, adjusting for medical assistance (a proxy for socioeconomic position) and other individual-level variables and accounting for clustering of individuals within communities. We stratified models by community type (rural/suburban townships, small town boroughs, city census tracts).

**Results:** Compared to communities with very good CS (750–799), excellent CS (800–850) was associated (by odds ratio [95% CI]) with lower T2D odds (0.88 [0.82, 0.94] for townships; 0.76 [0.63, 0.91] for boroughs; 0.58 [0.42, 0.81] for cities). We did not observe this relation in lower CS communities. CS and CSD correlations varied from -0.43 (townships) to -0.76 (cities). High CSD remained associated with higher T2D odds in models restricted to high CS (≥750) communities.

**Conclusion:** Though excellent CS was associated with lower odds of T2D, CSD may measure additional health-salient features in high CS communities.

**Evaluation of an Electronic Clinical Decision Support Tool for Incident Elevated Blood Pressure in Adolescents**

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Health Partners Institute, Bloomington, MN; Essentia Health, Duluth, MN; University of Minnesota Medical School, Duluth, MN; Essentia Institute of Rural Health, Duluth, MN; Carle Health, Urbana, IL

**Background:** Study goals were to describe the feasibility of adapting and implementing PedsBP CDS, an electronic health record-linked clinical decision support tool, for use in a...
rural health system and to describe repeat blood pressure (BP) measurement among patients 6–17 years of age with an incident hypertensive BP at high-intensity clinics using the PedsBP CDS.

**Methods:** We are conducting a pragmatic cluster-randomized trial in 44 community-based primary care clinics in a rural Midwestern health system. Clinics were randomized 1:1:1 to usual care, low-intensity implementation (PedsBP CDS only), or high-intensity implementation (Peds BP CDS plus in-person training, monitoring CDS use, and feedback). The PedsBP CDS includes an alert to remeasure a hypertensive BP at that visit, an alert that a hypertensive BP should be repeated in 1–3 weeks, and patient-specific order sets. Study outcomes include repeat BP measurement at an index visit and diagnosis of hypertension within 6 months of meeting clinical criteria.

**Results:** Among 9863 patients (mean age: 12.1 years, standard deviation: 3.3; 50.8% female) with a visit between June 29, 2022, and August 30, 2022, at 44 participating clinics, 1369 (13.9%) had an incident hypertensive BP and 75 (0.8%) met clinical criteria for hypertension. Of 3174 encounters at high-intensity clinics, initial BP was elevated in 388 (12.2%) and remeasured in 181 (46.7%).

**Conclusion:** The PedsBP CDS is feasible to implement in a new health system for improving pediatric BP care.

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**Guideline-Recommended Care for Primary Prevention of Cardiovascular Disease in a Primary Care Population and Race/Ethnicity Disparities**

Xiaowei (Sherry) Yan, Kimberly Buss, Alex Scott, Jiang Li, Jacqueline Liu, J.B. Jones

**Center for Health Systems Research, Sutter Health, Walnut Creek, CA; Population Health Management, Sutter Health, Sacramento, CA**

**Background:** Cardiovascular disease (CVD) is the leading mortality cause worldwide. CVD incidence triples in those 40–50 years of age, as compared to younger. Although CVD preventive care recommendations have been provided in clinical guidelines, <40% of at-risk patients complete any preventive care services. Moreover, race/ethnicity disparity in CVD preventive care remains unclear.

**Methods:** Working with primary care providers/expertise, we converted USPSTF/ADA/AHA CVD preventive care guidelines to discrete rules for blood pressure, diabetes, and dyslipidemia management for eligible patients. Descriptive statistics were summarized to find gaps in care in population and race/ethnicity groups.

**Results:** We identified 537,518 patients, age ≥50 years, with no atherosclerotic CVD evidence in the 2 years before first primary care visit in 2010–2021: 61% non-Hispanic White (NHW), 3% non-Hispanic Black (NHB), 9% Hispanic, 15% non-Hispanic Asian (NHA), and 12% others. Among this population, <41% had blood pressure controlled; NHB was lowest (29%) and NHA was highest (50%). We found significant gaps in 1-year-prior screening: 62% had no low-density lipoprotein cholesterol (LDL-C) and 85% had no hemoglobin A1c; 8% were controlled in LDL-C screening, with NHW the poorest controlled (7%); 61% were under control in hemoglobin A1c screening, with NHB the poorest controlled (51%). Among the 22% who were in stage I/II hypertension, only 36% were on hypertension drugs. For patients 50–75 years old with LDL-C of ≥70 mg/dL or atherosclerotic CVD risk of ≥5%, 86% were not on dyslipidemia guideline-suggested statin intensity.

**Conclusion:** We observed significant gaps in CVD risk screening with large variation among race/ethnicity groups, which hinders the timely subsequent disease management.

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**Racial/Ethnic Variation in Multimorbidity Patterns and Health Care Services Among Oldest-Old Patients**

Jinmyoung Cho, Gelareh Rahimighazikalayeh, Heather Allore

**Baylor Scott & White Research Institute, Temple, TX; Baylor Scott & White Research Institute, Dallas, TX; Yale University, New Haven, CT**

**Background:** Adults age 85 years and older are perceived as survivors resilient to age-related risk factors. However, less is known about unmet needs in health and health care service utilization in health systems despite considerable heterogeneity. We examined racial/ethnic variation in patterns of multimorbidity associated with emergency department (ED) and clinic visits among patients with multiple chronic conditions (MCCs).

**Methods:** Administrative and clinical data from an integrated health system for 5 years included 25,801 patients with MCCs. Hierarchical cluster analysis identified MCC patterns by 4 racial/ethnic groups (White, Black, Hispanic, and Other). Clusters associated with ED and clinic visits were analyzed using generalized estimation equations.

**Results:** Mean MCCs was 5.79, ranging from 5.36 to 5.82. Hypothyroidism, Alzheimer’s disease and related dementia, bone-and-join, metabolism syndrome, and pulmonary-vascular clusters were commonly observed. Unique cluster patterns were identified among Black patients (renal diseases were grouped with metabolic syndrome). While almost all clusters were significantly associated with ED and clinic visits among White patients, distinctive clusters were significantly related to ED and clinic visits among Hispanic patients (bone-and-join grouped with renal diseases was significantly associated with ED and clinic visits, respectively).

**Conclusion:** Findings suggest a need for culturally tailored care management in integrated health systems.

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**The Dialysis Obesity Paradox and Intradialytic Hypotension Among Hospitalized Patients**

In-Lue Amy Liu, Edward Lin, Beth Creekmur, Aiyu Chen, Hui Xue

**Department of Research & Evaluation, Kaiser Permanente Southern California, Pasadena, CA; Kaiser Permanente Los Angeles Medical Center, Los Angeles, CA; Kaiser Permanente San Diego Medical Center, San Diego, CA**
Background: Contrary to the general population, higher body mass index (BMI) is associated with lower mortality risk in patients receiving hemodialysis. The biologic basis for the obesity paradox for patients on hemodialysis is unclear, and we propose that obesity is protective in hemodialysis due to reduced rates of intradialytic hypotension (IDH).

Methods: In 2019, inpatients on hemodialysis (n=17,357) were evaluated at Kaiser Permanente Southern California. BMI was categorized as <18.5, 18.5–30, 30–35, and >35. The relationship between BMI and IDH was modeled using multivariable repeated measures with covariates: age, gender, race, utilization, hemodialysis sessions, hemodialysis starting temperature, starting blood pressure, fluid removed, and Elixhauser.

Results: IDH risk is higher at each end of the BMI spectrum, at <18.5 and >44 in a U-shaped curve, with the highest risk at BMI 17. Normal BMI has the lowest IDH at 29.83% of all treatments. After stratifying for blood pressure at start of hemodialysis treatment, BMI of 30 to 35 appears most protective against IDH regardless of starting blood pressure.

Conclusion: A U-shaped relationship between BMI and IDH has been identified in our work after adjusting for covariates. BMI may serve as an actionable target to help reduce inpatient IDH and help minimize end-organ damage, thus improving survival on hemodialysis. Further work is warranted to understand the dialysis obesity paradox in end-stage kidney disease.

COVID-19 and OTHER VACCINE-RELATED CONDITIONS

Exploring Racial Disparities in Required and Nonrequired Vaccines for Adolescents

Jennifer Heliste, Courtney McCracken, Issmatu Barrie, Sundeep Basra, Teanise Davis, Michelle Henninger, Sonia Kim, Bennett McDonald, Marsha Wright, Nancy Weinfield

Background: The purpose of this current scholarship is to evaluate participation rates and responses to the online, student-led community health programs among residents of MidPen Housing. Culturally appropriate materials teach residents about iPad use, teleconference software, and troubleshooting technical issues.

Methods: Data collection occurred pre-pandemic, at the first stage of shelter-in-place, and post-technology distribution (ongoing). Collection methods varied among the different clinical groups and cohorts. Several surveys are administered to residents before the clinical rotation and again after the last day of each rotation. Pre-pandemic, resident participation ranged from 8 to 15 residents daily. Larger intergenerational events averaged 29 attendees.

Results: During the first stage of shelter-in-place with the transition to an online format, resident attendance plummeted to 2 to 7 residents, with an average of 4 participants. Following iPad distribution to residents, attendance increased, ranging from 8 to 18, with an average of 11 participating in a single program.

Conclusion: The COVID-19 pandemic disrupted in-person programs with mandated stay-at-home orders and quarantine precautions. Since older adults are at higher risk of contracting the virus, community engagement programs were converted to telehealth. This format created opportunities for students to explore alternative and creative telehealth methods to address mobility, social isolation, and health promotion needs of vulnerable populations.
Determinants of COVID-19 Health Outcomes Disparities Among Patients With Sepsis in St. Louis, Missouri

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Saint Louis University, St. Louis, MO; University of Mississippi, Oxford, MS

Background: Patients with sepsis who are diagnosed with COVID-19 are at higher risk for unfavorable health outcomes. This study aimed to understand the role of sociodemographic characteristics and their impact on hospitalization and death rates among patients with sepsis and especially those diagnosed with COVID-19.

Methods: Patient record data from Saint Louis University Hospital between March 2020 and August 2021 was utilized. Multinomial logistic regression analyses were used to examine the association between sociodemographics, hospital length of stay, and the likelihood of death, home discharge, or discharge to other facilities for patients with sepsis, including those diagnosed with COVID-19.

Results: Of 2668 sepsis-positive patients, 382 (14%) had COVID-19. Patients with both COVID-19 and sepsis had longer hospitalization and higher mortality rates as compared to sepsis-only patients. As compared to White patients, Black patients with sepsis and COVID-19 had higher mortality rates and Black patients with a sepsis-only diagnosis had lower mortality rates.

Conclusion: This study further substantiates the need to address the existing disparities among patients with sepsis and COVID-19 to ensure timely treatments are deployed to improve long-term health outcomes.

Did Telehealth Contribute to Avoidance of Care Disruptions for Medicare Beneficiaries During the COVID-19 Pandemic?

Aditi Pathak, Karin Johnson, Tanvi Rao

American Institutes for Research, Arlington, VA; American Institutes for Research, Crystal City, VA

Background: Older adults with ambulatory care sensitive conditions (ACSCs) are particularly vulnerable to COVID-19-related care disruptions. Medicare policy waivers during the COVID-19 pandemic led to dramatic shifts from in-person care to telehealth. We studied the extent of delayed and forgone care for Medicare beneficiaries with ACSCs and if telehealth avoided care disruptions.

Methods: We conducted quarterly repeated cross-sectional analysis of fee-for-service (FFS) claims from a 5% random sample of Medicare beneficiaries between 2017 and 2021. Included beneficiaries were those ≥65 years of age with at least 1 of 5 ACSCs — hypertension, congestive heart failure, diabetes, asthma, or chronic obstructive pulmonary disease. Visit type and modality were based on claims; demographic information was based on enrollment data.

Results: Telehealth visits as a proportion of all FFS ambulatory visits peaked during the pandemic’s first wave (2020 Q2), during which time they offset less than half (40%) of the decline in in-person visits for FFS beneficiaries with ACSCs. Then, telehealth visits declined significantly for primary care and specialty care but remained high for behavioral health. Findings suggest disparities in delayed and forgone care by race and ethnicity, rural and urban residency, and Medicare-Medicaid dual eligibility status.

Conclusion: Care disruptions occurred for traditional Medicare beneficiaries despite dramatic growth in telehealth during the pandemic.

Research-Operations Partnership to Respond to Emerging Questions About SARS-CoV-2 Serological Testing

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Background: The COVID-19 pandemic led to emerging questions about COVID-19, testing, and the demand of tests from frontline workers and members.

Methods: Kaiser Permanente Colorado (KPCO) leadership established an Emergency Operations Command (EOC) Center and approached the Institute for Health Research to research. The institute mobilized a team that included a robust research team and key operational stakeholders from the EOC, laboratory, scheduling, and information systems. Between June 2020 and January 2022, a research-based testing program was established, including a process for informed consent, surveying, testing, and communicating with members. Serial surveys and viral and antibody tests for SARS-CoV-2 were encouraged. The research team developed and administered online surveys, facilitated lab and test ordering, communicated with participants, and collected and analyzed data. Operational partners automated lab orders, scheduled appointments, conducted testing, and provided follow-up clinical care for COVID-19 cases.

Results: Individuals were recruited and followed for 10 months, including 377 frontline workers and 4235 general members. Data were analyzed and shared about testing results.

Conclusion: In a rapidly evolving pandemic, health care researchers and operational leaders leveraged their network to collect data, make decisions, meet member demands, and provide responsible communication about scientific uncertainty. The critical elements of the partnership’s success include identifying key stakeholders, defining responsibilities, communicating often, and keeping perspective that everyone was doing their best in a pandemic situation.
Telemmedicine Use and Access to Care Among Adults With Limited English Proficiency During the COVID-19 Pandemic

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Background: The exponential use of telemedicine during the COVID-19 pandemic necessitates special focus on individuals with limited English proficiency (LEP) to ensure that they are not left behind in the digital divide. We assessed the relationship between English proficiency and telemedicine use and evaluated the impact of telemedicine on access to care on LEP and English-proficient (EP) adults.

Methods: Cross-sectional data from the 2020 National Health Interview Survey (July–December 2020; n=16,906) were analyzed. Outcomes were telemedicine visit (video or phone), no doctor’s visit, emergency department (ED) visit, and hospital visit in the past 12 months.

Results: Fewer LEP adults had telemedicine visits than EP adults. Differences in telemedicine visits were not significant after adjusting for socioeconomic factors. Proficiency-specific multivariate results found telemedicine visits to be associated with lower odds of not having a doctor’s visit for LEP and EP adults. For EP adults, telemedicine visits also were associated with greater odds of ED and hospital visits.

Conclusion: Differences in telemedicine visits between LEP and EP adults during COVID-19 were explained by socioeconomic status and health. Telemedicine visits appeared to facilitate access to doctor’s visits, but they may have also increased ED and hospital visits due to challenges in providing remote care effectively. More research is needed to understand the relationship between telemedicine and downstream health care use.

GENOMICS and PRECISION MEDICINE

Use of Cell-Free Tumor DNA in Early Detection of Lung Cancer

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Background: The U.S. Preventive Services Task Force recommends annual screening for lung cancer with low-dose computed tomography (LDCT) in adults 50–80 years old with 20 pack-year smoking history or current/former smoking in the past 15 years. This prospective study will evaluate whether we can detect lung cancer at the time of LDCT screening from cell-free tumor DNA using Guardant Health’s LUNAR-2 assay.

Methods: Kaiser Permanente Colorado (KPCO) members with upcoming LDCT screenings were invited via email/phone and recruited into two groups: 1) suspicious lung nodules; or 2) no lung nodules. Blood collection kits were mailed within 14 days of LDCT. We collected survey and electronic health record data on smoking history, LDCT, and other factors. The KPCO tumor registry confirmed all reported cancers.

Results: The study initiated in September 2020, with 978 individuals consented and 952 blood samples collected to date. Participant population was, on average, 68 years old, 56% female, 58% former smokers, and 85% no personal history of cancer. A total of 14 lung cancer cases and 22 other cancer cases were diagnosed. Data analysis is ongoing and expected to be completed mid-2023.

Conclusion: This study will demonstrate sensitivity and specificity of the LUNAR-2 assay to detect lung cancer relative to standard-of-care diagnostic workup in high-risk populations. We will also evaluate whether factors such as comorbidities, pack-year history, or medications affect assay accuracy. The impact of this research can inform blood-based early detection of lung cancer.

MATERNAL, CHILD, and FAMILY HEALTH

Overprescription of Ophthalmic Medications in Pediatric Outpatient Clinics: A Retrospective Chart Review

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Background: This study characterized trends and appropriateness of outpatient ophthalmic antibiotic prescriptions at a large academic pediatric hospital network.

Methods: Our single center retrospective study (January 1, 2019, to December 31, 2020) evaluated patients with an ophthalmic diagnosis or prescription. A subsection of the data (January 1–March 20 of 2019) underwent retrospective chart review to further characterize prescribing indications. An ophthalmic antibiotic was considered appropriate if it was prescribed when needed and, when needed, the right antibiotic was selected.

Results: There were 12,751 encounters associated with ophthalmic diagnoses during the study period. These diagnoses led to the prescription of 6739 ophthalmic antibiotics. In the chart reviewed subset, antibiotics were prescribed in 810 of 1310 encounters (61.8%), of which only 34 (4.2%, 95% CI: ±1.09%) were appropriate. Prescribing for self-limiting conjunctivitis types constituted the majority (60.1%) of inappropriate prescriptions. Of the 976 diagnoses of conjunctivitis types, 712 received antibiotics (73.0%). Visits conducted not in-person, that is via telehealth, the nurse-line, or by telephone, were much more likely to be inappropriate than visits done in-person (81.6% vs 45.4%, P<0.05).

Conclusion: Ophthalmic antibiotics are commonly over-prescribed in the ambulatory setting. Prescribing practices can be improved for conjunctivitis types and visits done not in-person.
MENTAL HEALTH

Barriers and Facilitators to Behavioral Health Services Follow-Up in Children Screened for a High Adverse Childhood Experiences Score

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Background: In February 2020, Kaiser Permanente Southern California piloted a new workflow to screen for adverse childhood experiences (ACEs) in pediatric primary care, with positive screens referred to behavioral health. This qualitative study sought to understand what is working well and what parts of the process are making it difficult to complete these referrals.

Methods: Semi-structured phone interviews were conducted with the parents of children (N=20) referred to behavioral health due to screening positive for ACEs who may or may not have completed a visit with behavioral health. Qualitative coding was then performed to identify themes from the interviews to determine barriers and facilitators to behavioral health follow-up.

Results: Emergent themes from code analysis include familial support, ease of virtual appointments, and preexisting concerns about the child’s behavior as facilitators to attending the referral. In terms of barriers, apparent themes include lack of explanation about the referral, lack of appointment availability, mental health stigma, and medication concerns.

Conclusion: Based on initial coding, it appears that many parents expressed the process worked well for them. However, there are also clearly ways in which the current ACEs screening and referral process could be altered to increase the referral completion rate.

Prevalence and Predictors of Depression in Women With Osteoarthritis

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Background: Osteoarthritis is the most common joint disease in the United States and can increase risk of depression. Both depression and osteoarthritis disproportionately affect women, yet there are few studies on depression prevalence and treatment across age groups of women with osteoarthritis.

Methods: Data were extracted from the 2011–March 2020 National Health and Nutrition Examination Survey (NHANES). Women ≥45 years of age with self-reported osteo- or degenerative arthritis were included. Outcomes were depression (assessed with the Patient Health Questionnaire) and treatment (self-reported pharmacotherapy and mental health services). Logistic regression was used to examine associations between age group, covariates (race/ethnicity, education, insurance status), and outcomes. All analyses were weighted to account for the sampling design.

Results: The final unweighted sample size was 15,399. Depression prevalence in the sample was 8%, with a higher proportion of positive depression screens among those 45–64 years old. Older age was associated with reduced odds of depression (odds ratio: 0.68 [95% CI: 0.52–0.89] for age 65–79; odds ratio: 0.49 [95% CI: 0.33–0.74] for age ≥80; both vs age 45–54). Of those with positive depression screen, 21.6% documented medication and/or a mental health visit in the past year. Age did not differ between those treated and those not treated.

Conclusion: Women in the 45–64 age group with osteoarthritis may be at increased risk for depression. Although age does not appear related to depression treatment, most women over age 45 with depression symptoms are not treated.

RESEARCH METHODS

Recruitment Invites With More Instructions Increased Recruitment Rates

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Background: Participant burden, real and perceived, can impact recruitment response rates into clinical trials and epidemiological cohort studies. Although recent literature has shown otherwise, previous literature suggests that when more than one option is included in the instructions about how to participate, response rates are depressed.

Methods: In the Connect for Cancer Prevention Study recruitment efforts, we tested two initial study recruitment invites. Potential participants were randomized to 1 of 2 letters to invite participation. Each asked participants to register online with a provided link. One group was randomized to a letter with instructions to enter a personal identification number (PIN) to match to their existing record, while others were sent a letter with no step to enter a PIN. Invitees could self-register online. Phone call attempts were made after 2 weeks to invitees who did not respond. All invitees who expressed interest by phone were emailed a unique link that matched their registration with their existing record. Once registered, patients consented online. Registration and consent rate of those invited with and without PIN are reported.

Results: Among 3809 invites with a PIN, 9.6% registered and 8.3% consented. Of the 3974 invites without a PIN, 7.9% registered and 7.6% consented. The recruitment plan demonstrated two successful invite letters that yielded high recruitment rates.

Conclusion: The higher recruitment rates for those invited with a PIN suggests we send all invites with a PIN.
Recruiting for a Multisite Pragmatic Clinical Trial During COVID-19

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Background: Three HCSRN sites (Kaiser Washington [KPWA], Kaiser Permanente Northern California [KPNC], and Sutter Health [SH]) and the Institute for Family Health (IFH) in New York partnered to conduct an National Institutes of Health-sponsored pragmatic trial of acupuncture vs usual care among at least 789 older adults with chronic low back pain. Because this was a multisite study and the pandemic flared at different times in the different geographies, recruitment was halted by individual research departments, staffing issues emerged, and both patients and acupuncturists expressed COVID-19-related concerns. In response, we conducted infection-control assessments with our practitioners, adjusted study timelines, and monitored local infection patterns.

Methods: KPWA (the coordinating center), KPNC, SH, and IFH were responsible for recruiting 174, 288, 204, and 123 participants, respectively. We describe herein some of our key challenges, opportunities, and successful solutions for conducting a multisite pragmatic trial in a high-risk population during COVID-19.

Results: The pandemic delayed recruitment initiation (scheduled for January 2021) for all sites. In 2021, actual recruitment began at KPWA and IFH in July, SH in October, and KPNC in December. Periodically, recruitment was halted by individual research departments, staffing issues emerged, and both patients and acupuncturists expressed COVID-19-related concerns. In response, we conducted infection-control assessments with our practitioners, adjusted study timelines, and monitored local infection patterns.

Conclusion: Because this was a multisite study and the pandemic flared at different times in the different geographies, recruitment overall was able to continue uninterrupted. COVID-19 affected each center at different times during recruitment; therefore, the study team was able to leverage these differences to meet target recruitment goals throughout the study and surpass final study recruitment goals and on schedule.

“Who Says Older Folks Aren’t Tech-Savvy? Experience With a Fully Electronic Consent Procedure in a Trial With Older Adults”

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Background: It is widely perceived that older adults have challenges using digital technology to participate in research. We used our experience in the BackInAction study (National Institutes of Health-funded randomized controlled trial of acupuncture for adults ≥65 year old with chronic back pain; #NCT04982315) to examine this belief.

Methods: At 2 of the 4 clinical sites, patients were offered 2 options for consenting: mailed written paper consent or electronic consent using Adobe Sign (at Kaiser Permanente Northern California [KPNC]) or REDCap (at Sutter Health [SH]). Consent completion rates for each type and associations with age, sex, and race/ethnicity were examined.

Results: Of the 509 patients completing consent, 295 (58.0%) were KPNC members and 214 (42.0%) were SH patients; 53% of patients were 65–74 years old, 41% were 75–84 years old, and 6.5% were at least 85 years old. Overall, 423 respondents (83.1%, 95% CI: 79.6% to 86.3%) successfully completed an electronic consent. The use of electronic consent at KPNC was similar to that of SH (85.4% vs 79.9%, respectively). Use of electronic consent was associated with younger age at both sites, with White race at SH, and was not association with sex at either site.

Conclusion: In this trial of older individuals, the great majority of patients chose and fully executed an electronic consent form, greatly facilitating trial recruitment. Electronic consenting should not be viewed as a barrier to enrollment of older adults in clinical research.

Generation of a Dynamic Drug Recommendation Tool for Rheumatoid Arthritis Using Real-World Cost Information

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Background: Cost-efficient prescribing for patients and systems is challenging in integrated delivery networks when multiple clinically equivalent options exist. We developed a dynamic drug recommendation tool to help providers overcome this challenge using rheumatoid arthritis as a pilot.

Methods: We collected fills and claims data for all rheumatoid arthritis drugs prescribed by Geisinger rheumatologists to patients with rheumatoid arthritis in 2021. 340B and non-340B drug acquisition costs (DAC) were obtained from pharmacy dispense data, MacroHelix, and our procurement team. Mean reimbursement, rebate, and cost-sharing data also were collected. External reimbursements were obtained via pharmacy dispense data and from assumptions based on average selling price and wholesale acquisition costs for missing values. We computed 4-week DACs and reimbursements per individual dosing schedules. We built multiple script scenarios (SC) to account for payor and plan type, routing pharmacy, site of care, and 340B status, and performed an SC-weighted, volume-adjusted
cost analysis to assess the financial impact for internally and externally insured patients. We ordered drugs based on their net financial impact considering SC and clinical standards. We developed a front-end decision tree interface linked to 8 tables covering multiple preset patient SC with input from rheumatologists and clinical pharmacists on preference and usability.

Results: Implementation and evaluation are ongoing.

Conclusion: We plan to replicate the tool for other high-cost conditions.

Predicting 30-Day Hospital Readmission Using Machine Learning in a Nonhospital-Based Integrated Health System

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Background: Hospital readmission is associated with increased mortality, morbidity, and cost. We aimed to develop a predictive model to improve upon the ACE/LACE index for patients served by Kaiser Permanente Georgia (KPGA) using automated data accessible within our outpatient electronic medical records (EMR), based on 36,998 adult, unplanned admissions with a home discharge from 2016 to 2019.

Methods: Readmission was defined as readmission within 30 days of discharge. (30DR). C-statistics and reclassification metrics were generated from a supervised machine learning logistic regression to assess model performance. Univariable analysis and principal component analysis were used to screen variables and assess variable dimension, respectively.

Results: We constructed separate 30DR models for Medicare and non-Medicare populations. These models outperformed the ACE/LACE 30DR score c-stat (Medicare: 0.58, non-Medicare: 0.51) vs model validation c-stat (Medicare: 0.69, non-Medicare: 0.71). Applied retrospectively, the models together reclassified 11% more readmitted patients as high risk vs ACE/LACE score alone.

Conclusion: Our outpatient EMR-based models outperformed the ACE/LACE index to better predict 30DR for KPGA patients. Health systems can use their EMR data to identify patients at high risk for readmission. Improvement of 30DR risk prediction stratification allows for targeted allocation of resources to reduce hospital readmission.