NIH National Cancer Institute

Measures and Methods to Advance the Science of Teaming and Coordination in Cancer Care

November 16, 2023
Virtual Meeting Summary

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Executive Summary

Introduction

On November 16, 2023, the National Cancer Institute's (NCI) Healthcare Delivery Research Program (HDRP), part of the NCI Division of Cancer Control and Population Sciences (DCCPS), convened a virtual workshop to discuss measurement and methodological approaches applicable to care delivery research on teamwork and care coordination across the cancer care continuum. The goals were to highlight measures of team and care coordination constructs adopted in current cancer-focused research, understand measurement challenges, and identify opportunities for future research.

HDRP representatives set the stage: **Veronica Chollette** reviewed how team science emerged to improve quality in cancer care, citing studies over the past two decades; noting the establishment of NCI's 2012 Health Care Teams initiative; and recognizing Dr. Stephen Taplin, who mapped the interplay of multilevel structures in which clinical care teams maneuver across the cancer continuum. **Dr. Janet de Moor** underscored that HDRP hosts meetings like the current workshop for the purpose of identifying existing research gaps and prioritizing areas for future inquiry. Before teamwork practices in cancer care can be improved, she explained, they must be measured first.

Morning Keynote: Measuring What Matters Most

Jeremy Pivor, a young-adult advocate living with cancer, first asked the audience to step into the shoes of someone visiting their doctor. At the start of the visit, he asked them to imagine being asked, **"What matters to you most?"** and to envision their own answer to this question. The answers to this question, he believes, provide unique insight into what creates quality of life for each of us.

Mr. Pivor noticed a stark contrast between the careful coordination of his pediatric appointments—and the adult reality of not being offered any coordination at all. He shared the work that both he and his family did to coordinate his care, as well as their efforts to find useful communication and coordination tools. Mr. Pivor emphasized appointment coordination, communication, and reducing the overall burden of coordination work on patients and caregivers. He further emphasized the importance of measuring teaming and coordination in ways that align with what matters to patients and caregivers. Discussing whether his current participation in a trial posed an additional coordination burden, he shared that the trial nurse provides the best adult-patient navigation services he has ever received.

Where We Are: Measuring Teaming and Coordination in Cancer Care Delivery

HDRP's **Dr. Sallie Weaver** noted that although topics like methods and measures may seem "in the weeds," Mr. Pivor reminds us "why we are here." She traced the field's origins to 1950, when a coordinated hospital service plan was first published by the U.S. Public Health Service. She also defined basic terms as groundwork for the day's discussions: "Teams" refer to both the structure and processes for coordinating interdependent work under shared goals, while "teaming," a verb, means to apply the practice of effective teamwork to situations lacking stable team composition or structure.

Key Takeaways

Experts in **survey and qualitative measures and methods** discussed approaches to improve the survey response rates of clinicians and patients, such as **Dr. Stephanie Zajac's recommendation** that surveys be implemented as part of already-scheduled work activities. Providers should know "what's in it" for their practice community and patients, she added. During the subsequent panel discussion, **Dr. Donna M. Posluszny** recommended surveyors work around the participant's schedule.

Observing caregiver's roles in the exam room and at home, **Dr. Posluszny** described the patient and caregiver as a team. **Dr. Michaela Kerrissey** proposed a broader conceptual model of integrated care that recognizes the normative and interpersonal aspects of integration alongside more frequently studied structural and functional aspects of care integration. During interactive breakout sessions, attendees prioritized potential research opportunities to (1) identify the minimum key teamwork factors for improving care and (2) understand how we can better integrate survey and other qualitative data in meaningful ways.

Discussions on **EHR-based measures and methods** unveiled current efforts and future opportunities to gain insight on care coordination from "messy" electronic health record (EHR) data not originally designed to measure teamwork. **Dr. Sylvia Hysong** used Veterans Health Administration data on 7,750 patient-aligned care teams to study the relationship of team configuration and stability to care quality and access. **Dr. Bryan Steitz** analyzed EHR messaging data to illuminate the pattern and content of care coordination within and between clinical breast cancer teams. In particular, he showed the time burden involved in team communications as well as analyzed its content, which varies by stakeholder role and includes both clinical and logistical (i.e., coordination) information. Highlighting the "sociotechnical" nature of healthcare networks, **Dr. Shin-Ping Tu** reported that her analysis of connections between 1,933 healthcare professionals resulted in 267,826 EHR information ties. Her team hopes to develop algorithms for communication structures that reduce the risk of poor outcomes for people affected by cancer. Participants in the EHR-focused breakout also expressed their future interest in measuring inter-team communications and connecting EHR-based team measures with clinical outcomes.

Panelists focused on **population and claims-based measures and methods** spotlighted their efforts to advance teamwork science in novel ways. **Dr. Craig Pollack** highlighted network modeling as a powerful tool to study emerging social patterns in healthcare, take lessons learned, and emphasize opportunities to understand and strengthen ties among weak connections in care delivery networks. He also discussed his research using measures of "care density" to establish the amount of patient-sharing among a patient's providers and associations with care quality, cost, and the spread of clinical innovations.

Dr. Erika L. Moen discussed her work to develop an indicator of "linchpin" oncologists as a measure of healthcare delivery network vulnerability, particularly for rural, lower socioeconomic, and minority populations who are shown to have lower cancer survival rates. This aligned with what the breakout group recognized as an opportunity to identify health inequities using care coordination measures—and inform policy.

Dr. Lisa C. Lindley drew on her experiences studying (the lack of) cancer care coordination for children and adolescents in Medicaid-enrolled hospice care to spotlight gaps in measures and data elements that could capture these teamwork activities. She also cited opportunities to test and validate measures, including applying natural language processing to generate them, aligning with breakout group consensus.

Afternoon Keynote: What Connects Us

Noting how interactions within and between care teams are fluid, **Dr. Ingrid Nembhard** celebrated these connections as opportunities to study teaming behaviors and emergent states like team cohesion. Dr. Nembhard emphasized the need to adopt a relational coordination perspective, utilize network theory and analysis methods, and to ensure research and the measures used reflect the multi-level, multi-layered nature of care. She reminded attendees that the work they do charts the path to intervention. In the question-and-answer follow-up, Dr. Nembhard contemplated the EHR as not just a platform, but a team member that likewise creates ties.

Closing Thoughts and Wrap-up

Moved by the keynotes, **Dr. John Mathieu** applied the concept of dynamic centrality to the uneven coordination of his own cancer care; thus, he encouraged researchers to look at measures and methods used to study brokerages and crews, which can develop in the absence of a navigational "quarterback" and may have characteristics like teaming and coordination in chronic disease care, including cancer. Echoing workshop speakers, **Nicholas Faris** advocated for a patient-centric approach to link measures with outcomes. **Dr. Weaver** closed the workshop by encouraging the audience to leave the workshop with a commitment to address the gaps and opportunities identified throughout the day's discussions.

Breakout Sessions

See the Breakout Sessions section on page 24 for a list of challenges and opportunities that the attendees identified for three of the workshop's focus areas.

Workshop Overview

This event brought together cancer control, healthcare delivery, organizational behavior, and teamwork scientists to discuss measurement and methodological approaches that can strengthen the rigor and reproducibility of care delivery research on teamwork and care coordination across the cancer care continuum. Workshop goals were to:

1. Summarize existing healthcare teamwork and coordination measurement tools and evaluate their strengths and limitations in the context of cancer care delivery research.

2. Discuss unique challenges and opportunities for measuring care team functioning across care settings, facilities, and health system boundaries.

3. Discuss gaps, adaptation of existing measures, and opportunities for novel measures and methods better suited to understand the functioning of large, complex, and often distributed cancer care teams that could enhance research on teaming and coordination in cancer care.

4. Identify potentially promising common data elements, instruments, or approaches for assessing cancer care team functioning and the best methods for implementing these measures in practice.

5. Identify other opportunities to strengthen the rigor and reproducibility of care delivery research on teamwork and cancer care coordination to ultimately strengthen clinical practice, reduce burnout, and improve outcomes across the cancer continuum.

Welcome and Background

Veronica Chollette, RN, MS

Program Director, Health Systems & Interventions Research Branch, Healthcare Delivery Research Program (HDRP), National Cancer Institute (NCI)

Veronica Chollette welcomed attendees to the workshop with kind words about the organizers, the speakers, and her NCI colleagues. She expressed gratitude for the participants who had gathered to discuss how to best measure team functioning within and across settings, facilities, and health systems.

Ms. Chollette reviewed how efforts to apply the science of teams emerged as an endeavor to improve quality in cancer care through team-based practices, citing landmark studies and noting the establishment of NCI's Health Care Teams initiative in 2012. She noted discussion of teaming and coordination issues at several recent meetings of the National Cancer Policy Forum and in other National Academies of Science, Engineering, and Medicine activities. Currently, she explained that cancer care is complex and fragmented, workforce capacity is strained, and research tools are lacking.

She recognized Dr. Stephen Taplin, a former leader within NCI DCCPS, physician, and scientist, who mapped the foundational interplay of structures in which clinical teams maneuver, from national policy to local practice settings to individual patient characteristics. She also outlined recent program news, including:

- A Notice of Funding Opportunity for Research on Interprofessional Teamwork & Coordination during Cancer Diagnosis and Treatment **(NOT-CA-22-014)**

- A **January 2023 special series in the JCO-Journal of Oncology Practice** on the science of teams in cancer care that provided a 7-year update to the 2016 special journal series resulting from an NCI-American Society of Clinical Oncology collaboration.

Ms. Chollette acknowledged the spectrum of attendees, a collective she hoped would debate and discuss how to strengthen rigor in team-based science—and encourage other researchers to join in.

Janet de Moor, PhD, MPH
Acting Associate Director, HDRP, NCI

Dr. Janet de Moor added her thanks and welcomed the virtual participants, including giving a special shout-out to first-time attendees among the gathered multidisciplinary investigators seeking to discuss the state and future of care delivery science in a mutual learning environment. She underscored that HDRP operates with a mission to advance innovative research to improve cancer care delivery and thereby improve public health.

She recognized the HDRP research branches in the areas of: Health Care Assessment, Health Systems and Interventions, and Outcomes. She noted that the Health Systems and Interventions Research Branch led planning efforts for the current Methods and Measures workshop and thanked the organizing committee, which involved members across DCCPS. Providing funding, strategic planning, and data development support, HDRP manages an extramural research portfolio, supporting approximately $127 million in extramural research awards in fiscal year 2022. Meetings like the current workshop are an integral part of the division's imperative, she emphasized, to identify research gaps and prioritize areas of inquiry.

Dr. de Moor described the broader role of DCCPS in reducing the negative impacts of cancer on individuals through its management of cancer care research on etiology, prevention, detection, diagnosis, treatment, and survivorship. Importantly, well-functioning teams are critical to all phases of this continuum. To improve practices, we must measure them first.

Dr. de Moor emphasized that the science of teams is also integral to the National Cancer Plan objective to "end cancer as we know it." Likewise, research on effective teaming and coordination is germane to DCCPS strategic priorities to advance research that considers matters of equity, digital health, data strategies, climate change, modifiable risk factors, and evidence-based policymaking.

Measuring What Matters Most

Jeremy Pivor, MS

Director of Partnerships and Youth Engagement, Bow Seat Ocean Awareness Programs, and Patient Advocate

Jeremy Pivor recounted his interactions with the healthcare system as a child and as an adult with cancer. He began by asking the audience to step into the shoes of someone living with cancer. Visualizing a visit to the doctor, he asked the audience to think of three answers to the question, **"What matters to you most?"**

Of about 100 responses, he highlighted family and friends—plus quality of life, being useful, and a good outcome. Others spoke of peace of mind, joy, and compassionate care. Mr. Pivor believes these answers reflect each patient's diverse values and provide unique insight into what creates quality of life.

A brain tumor discovered when Mr. Pivor was a child introduced the family to team-based cancer care, as ongoing seizures demanded surgery to combat the disease. After 10 years of recovery, he was well enough to play tennis, attend college, and travel. When the cancer returned, Mr. Pivor underwent further treatment, while at the same time he attended medical school and later pursued training and a career in environmental public health. More recently, he started treatment with experimental therapy.

Currently an advocate for young adults with cancer, Mr. Pivor noticed a stark contrast between the coordinated itineraries and communications surrounding his pediatric appointments and the siloed, disjointed experience he faced once he came of age. For each clinician, he and his caregiver spent much time obtaining referrals, scheduling and going to appointments, handling insurance matters, and providing updated medical histories to each provider.

Referrals don't equate with coordination, Mr. Pivor argued. When cancer care isn't coordinated, he said, patients and caregivers must fill the gaps. We do this in part by prioritizing the coordination of communications and appointments. For example, he recalled contacting his providers one at a time to tell them his cancer was back. Mr. Pivor also highlighted four perspectives that measures of teaming and coordination should consider—patients, caregivers, clinicians, and systems. Mr. Pivor emphasized appointment coordination, communication, and reducing the overall burden of coordination work on patients and caregivers. He further emphasized the importance of measuring teaming and coordination in ways that align with what matters to patients and caregivers.

He finds the time from diagnosis to treatment to be critically important, because a lack of coordination, he added, causes delays—and stress for the patient and caregiver. He asked, does a visit to a multidisciplinary center save costs, improve outcomes for both the patient and provider? Well, he answered, let's measure these things and find out.

Patients should be asked if they feel heard, Mr. Pivor emphasized, as part of whole-person care. Furthermore, he asked researchers to place what matters for each patient front and center in the medical chart for all to see. He explained that healers can help "create meaning from something that seems meaningless" by including palliative care providers, engaging patients and caregivers, and learning about the patient, not just the disease.

Mr. Pivor also advocated for patients to receive coaching on how the health system works and resources available to them. He concluded by thanking the attending researchers for their imperative and impactful efforts to improve teaming and care coordination.

Questions for Mr. Pivor and Answers

Ms. Chollette thanked Mr. Pivor for sharing his experiences with well-managed, and not-so-well-managed, care.
Your moving story sets the stage for our discussions, she explained, and impacts our efforts on behalf of the millions diagnosed with cancer.

Question: Do you have any tips for cancer patients who are transitioning their records from pediatric to adult care offices?

    Answer: This burden often falls on the patient—who, like me, might have to compile imaging disks or deal with missing records. In the end, my team worked with what we had, which is not ideal.

Question: How old were you when you transitioned from pediatric to adult care?

    Answer: I was 22 years old. I became the oldest patient in the pediatric office and the youngest at the adult practice, the latter of which is isolating for young adults.

Question: What is one thing that providers could do to improve care coordination?

    Answer: In addition to continuing to develop multispecialty adult clinics, I think that delays and unnecessary testing could be avoided by innovating group communications. No patient should have to "gmail" providers in this day and age.

Question: What is your definition of coordinated care? Is it same-day appointments, records collection, identifying supportive services, or all of the above?

    Answer: All of the above. It means clinicians working together before the appointment and communicating with the patient so the individual knows what to expect.

Question: What are your thoughts on the patient–navigator model and where it falls short?

    Answer: As an adult, I wasn't offered any navigation at all. Instead, I found adult care to be a "factory." This role shouldn't fall on the patient (or my mom's) shoulders, nor should it depend on the patient's literacy with the healthcare system.

Question: What are your experiences in relation to disease- versus wellness-care models?

    Answer: Fatigue was my experience, which leads to further health problems and a negative cycle of exhaustion. By removing the navigation burden, patients can be freer to seek and have quality of life.

Question: How does the lack of care coordination affect patient trust in the healthcare team or system?

    Answer: I was lucky to have quarterbacks and a hero to trust 100%. But I know many patients come in already distressed and without heroes, so they let the "chips fall where they may," meaning they might not get all the care they need.

Question: Did being a part of a trial therapy add a burden to his journey?

    Answer: The addition of a clinical trial nurse gave me the best coordination I have received as an adult. The nurse acted as a communicator between the medical team and me. The only burden I faced was having to complete a medication diary every morning.

Sallie Weaver, PhD, MHS

Senior Scientist and Program Director, Health Systems & Interventions Research Branch, HDRP, NCI

Dr. Sallie Weaver previewed the day's agenda, filled with sessions intended to advance the measurement of teaming in cancer care delivery. Although topics like methods and measures may seem "in the weeds," she said, Mr. Pivor reminds us "why we are here." She illustrated the accelerated demand for care coordination with the following statistics:

- Thirty percent of Medicare patients see five doctors annually.[1]

- Outpatient visits to specialists are up 20% since 2019.[1]

- Survivors, even younger adults, see about five different specialists in the year post-diagnosis.[2]

Because teams are essential across the cancer care continuum, the measurements employed to assess their teamwork must also be up to the task. Dr. Weaver defined the term "team" as the structure and collection of processes for coordinating interdependent work under shared goals, while she distinguished "teaming" as a verb, which means applying the practice of effective teamwork to situations that lack stable structures. She continued by identifying "coordination" as the synthesizing of information, care goals, and decisions across groups involved in patient care and the aligning, timing, and adapting of key tasks among teams or team members over time.[3]

Dr. Weaver indicated that the current body of evidence lacks coherent measures, which inhibits comparisons across studies and creates contradictions in estimates of intervention performance. One path forward, she suggests, is to differentiate coordination mechanisms, coordination behaviors, emergent states that facilitate coordination, and "well-coordinated care" as an outcome to identify or develop relevant measures of each.

Based on 100 years of research, Dr. Weaver described what good teammates do: They monitor, exchange information, engage in backup behavior, and span boundaries between groups for collaboration purposes. Meanwhile, they negotiate and adjust along the way.

Dr. Weaver highlighted the myriad of future opportunities to improve reliability, validity, and generalizability of measurements, while also enhancing capabilities for researchers to disseminate findings and assess intervention performance. These work products will build on the steady stream of progress teamwork researchers have made since 1950, when a coordinated hospital service plan was first published by the U.S. Public Health Service. She cited recent tools, including the seminal 2014 AHRQ Care Coordination Atlas, containing approximately 80 measurement tools and Consumer Assessment of Healthcare Providers and Systems (CAHPS) Cancer Care Survey, relied upon by policymakers and payers. Other resources and papers related to the workshop topic are available at:https://events.cancer.gov/hdrp/cancercareteams/resources/

She looked forward to expanding the science of healthcare delivery teams beyond co-located teams, the adaptation of research from other disciplines to cancer care, and learning more about patient-caregiver teamwork. She also mentioned the ability of network analysis approaches to leverage routine healthcare data collection, digital trace data, and new social network measures based on electronic health records (EHRs).

However, challenges remain, she warned. The key information necessary to understand team and coordination concepts is still often contained in unstructured notes or not recorded in EHR data. Standardization in fields and values, timing, and record systems is needed. She also looked forward to a future that includes access to comprehensive longitudinal EHRs. For the future, she also hopes that theoretical grounding will be further developed.

Panel 1: Survey and Qualitative Measures and Methods

Bridging the Gap: Practically Useful Measures of Teamwork in Healthcare

Stephanie Zajac, PhD

Senior Change and Leadership Practitioner, Leadership Institute, MD Anderson Cancer Center, University of Texas

An organizational psychologist, **Dr. Stephanie Zajac** described her work assessing teamwork and building high-performance teams and "teams of teams" with frontline care providers and health system leadership teams. As one of two professionals engaged in team effectiveness at her center, she explained how her organization uses, integrates, and leverages teamwork measures.

She introduced a Team Effectiveness pyramid that is beneficial for driving team development and organizational initiatives. Organizational conditions, leadership, technical competence, and clear roles and purpose form the pyramid's foundation, upon which teamwork attitudes, behaviors, and cognitions, as well as psychological safety, adaptability, and resiliency combine to support team effectiveness.

Dr. Zajac uses a team diagnostic tool, designed in-house for use across care teams, that comprises 24 unique teamwork competencies. Based on findings from the team diagnostic, a deeper dive is made into areas of concern. She also uses employee engagement, inclusive leadership, and behavioral safety surveys to understand the workforce. For each survey, the Leadership Institute carefully develops or repurposes measures and identifies participants. It's important to define the relationship between concrete clinical process outcomes that apply at various points along the care continuum (e.g., in-basket response times, rescheduling activity) and validated teamwork instruments, Dr. Zajac advised, so that those teamwork measures can be employed more universally.

Dr. Zajac's advice is to make measures of teamwork concepts accessible to clinical health professionals during their regular activities—and easy to complete, particularly when there will be ongoing data collection, which often creates survey fatigue. Providers should know "what's in it" for their community and patients, she advised. She also recommended that research, operations, and administrative staff be included in surveys and feedback. She highlighted that an overlooked behavioral component of team functioning—attitudes—can undermine even the most-skilled clinical care team. Her work has also shown that the team leader has an outsized influence on team dynamics.

Interventions may include developing formal charters, norm building, coaching, training, or education, she stressed, and team growth is assessed over time. Conflict management and accountability are also part of the continuous improvement process. She pointed to a recent initiative to incorporate behavioral factors into the existing safety reporting of errors and near misses.

Understanding Patient–Family Caregiver Team-based Management of the Medical Regimen after Allogeneic Hematopoietic Cell Transplantation

Donna M. Posluszny, PhD

Associate Professor, Department of Medicine, Hematology/Oncology, University of Pittsburgh

On behalf of her co-investigators, **Dr. Donna M. Posluszny** talked about her experience with patient–caregiver dyads as they tackle medical care and lifestyle changes after the patient undergoes allogeneic hematopoietic cell transplantation. Spurred on by caregivers who wanted a place in the exam room, she set about understanding the cooperation between the patient and caregiver during treatment.

Her team, she explained, adapted (1) the Health Habits Assessment survey and (2) the Diabetes Family Responsibility Questionnaire to learn about patient adherence to regimen-related tasks and the distribution of responsibility for fulfilling them. Patients and caregivers were surveyed separately at two post-discharge intervals so that answers could be compared. At the same time, she proffered, this method rectifies the tendency of patients to underreport adherence failures.

Study results indicated there was wide variation in division of responsibility across tasks and no two dyads approached the division of responsibility for care tasks in the exact same way. Results of the smaller study suggested high adherence for tasks that were mostly the responsibility of the patient, but reduced adherence for certain medical regime tasks where responsibility was shared or mostly the responsibility of the caregiver (e.g., taking other pills, flushing central venous catheter line). However, compliance with behavioral requirements like diet and sunblock application was high if these responsibilities were shared. These results underscore the need to build the teamwork capabilities of the patient–caregiver duo and, she surmised, could produce better psychosocial outcomes. To intervene, her research team had the pairs engage in dyadic problem-solving therapy to solve adherence difficulties together. Dr. Posluszny cited the importance of integrating the caregiver into care while managing the diverse range and sequence of caregivers and caregiving.

Understanding Social Features of Health System Integration and Teaming in Healthcare Delivery

Michaela Kerrissey, PhD, MS

Assistant Professor of Management, Department of Health Policy & Management, Harvard T.H. Chan School of Public Health

Dr. Michaela Kerrissey referenced the wave of health system integrations that formed the backdrop for a research focus on organizational structure and functioning. She reported that this focus has often come with disappointing results.[4] She asked, "If the structures and functions (e.g., larger health systems, EHR) aren't drivers of improved outcomes, then what is?"

Dr. Kerrissey noted that while social process has long been seen as vital to healthcare delivery,[5] there has been limited measurement of these features.[6] Therefore, she proposes a broader conceptual model of healthcare delivery organization integration that recognizes the normative and interpersonal features of social integration, such as team climate, perceptions, and cognitions. In both perceived and externally collected quality measures like the Healthcare Effectiveness Data and Information Set (HEDIS), statistically significantly positive correlations are seen between job satisfaction and care quality. She

added that these approaches used in the coordinative format of primary care are transferable to the intensity and timelines of cancer care.

Dr. Kerrissey forecasted the importance of categorizing the social features in an environment where—as others had described—teams can be unstable and lack clear bounds. The focal unit of analysis can be complicated, she admitted. Because multilevel sampling and models are required, how we draw, sample, and aggregate units for comparative work is critical.

In the results of a survey on team composition. Dr. Kerrissey provided an example of two physicians in the same practice who perceived their teams to be vastly different in size and composition. Although larger teams are positively associated with outcomes, the impact on provider job satisfaction is curvilinear, becoming negative after a certain increase in size.

More research is needed to capture interpersonal content and norms from the teammate perspective. However, she presented role-based mental models and frequency scales as measurement strategies. Potential exists to link perceived measures with EHR/claims-based efforts for a fuller picture.

Panel Forum

Chair & Moderator:

John Mathieu, PhD

Board of Trustees Distinguished Professor, Friar Chair of Leadership & Teamwork, Department of Management & Entrepreneurship, University of Connecticut

Question: How do you balance the use of standardized measures so that they're comparable across situations, they're validated, with the user's desire for customized measures?

> **Dr. Zajac:** It's a challenge, but I don't have the luxury to make that call. I present what I want to do to internal clients with alternative options; if the clients want a customized set, we do that.

> **Dr. Kerrissey:** Finding the balance is an art more than a science. We take the validated teamwork measures from science that are relevant to healthcare, then adapt them. For example, we rephrased the measures so respondents would relate to the questions. It's important to have this conversation, but we should also create new measures to capture the fragmented nature of the care experience, which is something we want to get at.

> **Dr. Posluszny:** We try hard to find a measure that has been validated. Sometimes, the measure is available for the patient and not the caregiver. We try and get as close as possible, but even if the measure doesn't quite fit the caregiver, we still give out the validated measure.

> **Dr. Mathieu:** I like what you are all doing, identifying best practices and applying them.

Question: Have you thought about the crew model, which accounts for positions that can be filled by rotating people? And what about multiple and varying caregivers?

> **Dr. Posluszny:** We ask patients to identify their main caregivers, and they can't always answer the question that way. For some patients, caregivers rotate; for others, the caregivers are sequential. We need to account for all of these variances when we consider how the pair team is functioning.

> **Dr. Kerrissey:** Role-based mental models of the team's work are helpful and seem similar to the crew-based setup. Mental modeling has not been done in a systematic way, and it would be interesting to create universal measures that researchers can use across settings so we could look at things like climate and behaviors, based on defining "team" in the same way.

Dr. Zajac: I think there would still be confusion about which roles are on the team; for example, the medical assistant, the treatment navigator, the call coordinator. Answers on what these roles are, or which are included in the team, will be inconsistent.

Dr. Kerrissey: The answers would be especially inconsistent if you ask the patients. If the clinicians don't know who's on the team, then think about answers from the patient's perspective.

Dr. Zajac: The patient might not classify the person in the same role as the clinician does.

Dr. Mathieu: There's nuance in the literature about a standing team versus an active team. Standing teams in a Cancer Care system are ones that are available and potentially called upon based on the patient's etiology, symptoms, or treatment phase. Active teams are those that are actually called upon at any given time. There may also be core team members (e.g., oncologist) or entire teams that are involved throughout the care continuum. The system is fluid.

Question: How do you gather data—through surveys, interviews? Considering potential respondents are busy, what are some best practices for collecting data while not being overly obtrusive?

Dr. Posluszny: When I included the caregiver, caregivers were interested in doing the survey because no one was asking them anything. And the caregiver would tell the patient, "you are doing the survey." I would advise working around the participant's schedule, whatever it is. And we start by telling the participants the meaningful things we are going to do with the data.

Dr. Kerrissey: The second side of the coin is how soon can we give the information back to the teams—in protected ways they can use it—so they can reflect on their processes.

Question: To what extent is the gathering of data an intervention in itself? To what extent are you organizational change agents instead of data collectors?

Dr. Zajac: Sometimes giving the teams back the data does enough to raise awareness and put the topic on the table for the teams to think and talk about.

Dr. Kerrissey: If we give data back as a deliberate intervention, it would be great to do science around how you present this information to the teams.

Dr. Mathieu, with some humor: After that certain patient–caregiver experience, I imagine handing over that bar chart on agreement or disagreement on who's responsible probably sparks some conversation.

Dr. Posluszny: I hadn't really thought about it, but yes, it does. The teammates start making a plan, "This is you, and then this is me."

Question: Are there other sources of information to leverage besides surveys, such as portal information or stored in technology, where they are scripting next steps that give a behavioral flavor?

Dr. Kerrissey: This is the wave of the future. And you can tie the technology-based data with traditional surveys to obtain a rich picture.

Dr. Zajac: When I spoke with the physicians, they pointed to the information they already enter into EHR systems or patient portals so that no one has to be bothered to obtain it.

Question: What question is on your mind that we haven't addressed? Any point you'd like to make?

Dr. Zajac: This is an interesting time to be doing this research. Everyone I spoke with about this workshop was excited and they wanted to collaborate.

Network Analysis Approaches to Measure Team Configuration and Stability in Clinical Teams

Sylvia J. Hysong, PhD

Professor of Medicine, Baylor College of Medicine & Center for Innovations in Quality Effectiveness and Safety, Michael E. DeBakey Department of Veterans Affairs Medical Center

Dr. Sylvia Hysong discussed network analysis as an unobtrusive method to analyze the impact of primary care team configuration and stability on quality of care. In her study,[7] dual hypotheses anticipated better outcomes when (1) the team configuration more closely aligns with what's recommended and when (2) teams are more stable, particularly when the registered nurse (RN) role remains stable. She noted that the primary care model transfers well to cancer due to its coordinative nature.

Dr. Hysong said her team first correlated primary care team structures to key clinical quality measures. Next, adherence, team stability, and role stability were examined for their impact on healthcare outcomes, which are defined as (1) access and (2) quality. The study was designed as an observational data review over 24 months.

Data came from the Veterans Health Administration (VHA) health system, which encompasses 7,750 patient-aligned care teams at 1,050 facilities. In this system, the patient is located at the center of care delivery, supported by an RN, a scheduling clerk, a licensed vocational nurse, and a primary care physician. A key source for information was the regularly updated VHA team assignment reports.

Dr. Hysong's analyses examined degree (number of primary care teams to which a member is assigned), stability, role diversity (Blau's index), average size/change in size, and full-time equivalent hours. Particular attention was paid to stability or instability in the RN role over time. Clinical outcome measures were selected using an adapted Productivity Measurement and Enhancement System method, and Dr. Hysong's team relied upon electronic quality measures, HEDIS, and the VHA Corporate Data Warehouse for measures. The database analysis was supported by multilevel predictor models, configured to align with the dual hypotheses. Dr. Hysong reported the following findings:

- Primary care teams require a minimum capacity to deliver healthcare access and quality without having the danger of clinician burnout and turnover.
- Properly staffed and stable teams, specifically with the RN role, were associated with improved access to care.

Characterizing Communication Patterns among Members of the Clinical Team to Deliver Breast Cancer Treatment

Bryan Steitz, PhD

Instructor, Department of Biomedical Informatics, Vanderbilt University Medical Center

Dr. Bryan Steitz described his team's analysis of communications contained in EHRs to discover patterns in the coordination of care for individuals with breast cancer. His team extracted message logs about patients and from employees from 3 years of EHR data on breast cancer patients receiving outpatient care. The extractions were based on communication "sessions," defined as sequential activity involving the same patient within 5 minutes. There was also an understanding, he said, that inboxes are shared, messages can be flagged, and messages are contained within threads.

He explained that communications are valuable for documenting decision-making and coordination activities, allowing all roles on a care team to participate. However, messages are often time critical, and colleagues are expected to respond immediately. Incoming messages cause interruptions to the work flow, and variance in perceived urgency can create complications. Being constantly connected to patient needs is draining. In addition to the large volume of messages, healthcare professionals have shared that their workplaces suffer from too many collaborations and poorly distributed work tasks.

When communication prevalence is measured, 60% of appointments resulted in at least one message being sent within 48 hours. Dr. Steitz said that his study found that employees in the clustered network were involved in 40% of all message threads. Although EHR communications are a primary activity of care teams, nonphysician roles bear most of the messaging burden. Because administrative and clinical personnel spend time messaging, their minutes per session are also longer.

Of the total messages, 63% contain logistical information, with administrative and clinical staff sending/receiving in most of these messages, underscoring they are most likely to support coordination of care. In addition, 46% of messages serve as confirmational replies. Although clinical content comprises a smaller percentage of overall messages, physicians transmitted medical information more often than the other roles. These findings show how teaming for care coordination involves communication about both what needs to be done and how to do it. Dr. Steitz posited that these types of informatics can drive how we can improve efficiencies, reduce workload, and design electronic tools (e.g., developing mechanisms that allow the user to silence incoming messages at certain times and creating systems to manage acknowledgement replies).

SMART EHR Data Analytics to Enhance Cancer Care Multiteam Systems

Shin-Ping Tu, MD, MPH

Professor, Department of General Internal Medicine, UC Davis Health & UC Davis School of Medicine

As a primary care physician, **Dr. Shin-Ping Tu** shared her insight on how technology has ushered in a new era of communications and information-processing in cancer care delivery. She cited an anecdote in the 2015 book *The Digital Doctor*, describing a digital prescribing error for a common antibiotic that almost led to a patient death. She noted that physicians rarely meet with each other to discuss patients anymore, rather that technology is now primarily involved.

She also referenced a 2014 article in the Harvard Business Review, entitled "Getting Virtual Teams Right," which asserts that effective teams comprise fewer than 10 members. The Law of N-Squared indicates that, when a team grows, the number of communication links rises dramatically, eventually becoming unmanageable.[8] But Dr. Tu also recognized that complex medical care requires a "teams" approach. Merging the concepts of technology and humans, she presented a diagram of the multiteam framework system (MTS), which combines IT infrastructure with humans on care teams to illustrate full socio-technological networks.

In Dr. Tu's pilot study at Virginia Commonwealth University, the information ties between 1,933 healthcare professionals involved in the care of 100 patients were examined. This cohort included a core team of doctors, RNs, advanced practice nurse practitioners, and physician assistants, plus an ancillary group of radiology technicians, laboratory technicians, and others, such as a chaplain. This network of professionals had 267,826 EHR information ties.

Dr. Tu referenced Monge and Contractor to say that connection characteristics can help or deter timely and effective communications, information flow, and information processing.[9] She added that even structures of the same size have variance in their characteristics, as defined by factors such as centrality and closeness or betweenness.

She stated that the goals of her current research involving a breast, colorectal, and lung cancer patient cohort are to examine communications within and between groups to:

- Develop new measures for EHR communication in MTSs
- Determine associations of EHR communication structures with patient survival, ER visits, and hospitalizations
- Develop machine learning–assisted visual analytics and prototype tools to characterize the care history and predict patients associated with poor quality outcomes

Her team is focused on EHRs, a communication modality where multiple opportunities to intervene are captured, such as time points (e.g., diagnosis) and periods (e.g., treatment) that can extend over years if not decades. Using nodes and links in a graphical presentation, she noted how notes can be added at an early period, and then later, another physician references those notes, adding more documentation as this latter doctor becomes the dominant care provider.

The study measures include network analysis-based scores for such matters as centrality, modularity, global efficiency, and local clustering. These scores are supplemented by interviews with focus groups of healthcare professionals, patients, and caregivers to ascertain communication pain points, modality issues, network drivers, and the potential for alternate networks. Her team also assigned low- and high-impact valuations to documentation, based on the views of healthcare professionals.

Ultimately the goals are to determine where to intervene, based on a hypothetical patient summary report; develop visual analytics of a patient's medical history to take advantage of the huge amount of data in EHRs; and develop algorithms that can help us develop communication structures that reduce risk.

Panel Forum

Chair & Moderator:

Nicholas Faris, MDiv

Program Coordinator, Global Hematology, St. Jude Children's Research Hospital

Question: Do you feel there are some questions that are well-suited to be answered by EHR-based measures, compared to others, or just in general? What is the benefit of EHR-based measures of teaming and coordination?

> **Dr. Hysong:** The benefit of EHR is unobtrusiveness. We can get information without bugging clinicians, who have participation fatigue. However, EHRs don't capture interactions well. Fundamentally, coordination boils down to parties coming to agreements on what and when and having shared mental models and knowledge. An EHR is not well suited to capturing the transactive memory system.

> **Dr. Tu:** Regarding this issue of the transactive memory system, there are opportunities where large language models can scan unstructured EHR data, but this capability may be distant in the future. So I agree with Dr. Hysong.

Dr. Steitz: EHR offers the scalability, perhaps, across an organization or 100 organizations that surveys and interviews can't. But we're in a place where EHR audit logs don't include metrics on what is well-coordinated care, and EHR systems vary, while chart logs change with every update. We need to capture the same clinical processes across all these scenarios and understand what we can capture to have impacts on clinical work and patient care and what we can't.

Question: Is there a "template study" that can be used within our organization to study our messaging habits?

Dr. Steitz: One of the most surprising aspects is variability of messaging across workplaces. So there isn't a one-size-fits-all approach. At the provider level, there are tools like Epic's Signal tool and Cerner that provide comparisons and metrics across an organization.

Dr. Hysong: I want to echo Dr. Steitz's comment on variability. At the VA, we are changing the EHR system. It's the same as asking an iPhone and Android user what's the best way to perform a task. There are principles we can apply to agreed-upon approaches like when to message.

Dr. Tu: Echoing the other panelists, as teams we are continuously evolving. At our center, patient messages and calls are going to a call center, and call centers are becoming more prevalent. We are unclear about the expertise and skills these representatives have or what they have been trained in. Do they know what our team's roles and responsibilities are? These are fascinating things to look at across health systems.

Question: Dr. Tu, how does your team define high- versus low-value documentation?

Answer: I hope we will be able to define high- and low-value documentation, based on patient outcomes. We should look at the economic impacts of healthcare delivery at this stage. From the wider view, the million-dollar question is what is high- and low-value care? The current medical note has many notes that are not useful for patient care, but because billing is based on EHR, this is evolving. We hope to change the conversation on documentation.

Question: Are there guidelines or recommended team-related measures that would potentially impact quality measures in the clinical research setting? What characteristics or structures are associated with improved quality or regulatory compliance?

Dr. Hysong: I would love to study research productivity, but I have not thought about it from a team perspective, such as configuration and what characteristics are indicative of research productivity and quality. Research quality would be fabulous to unpack.

Mr. Faris: For a free idea, I would love to see Mr. Steitz's methodology applied to patients enrolled in a clinical trial and those who aren't, and see if we can quantify messaging differences. We know that patients enrolled in a clinical trial have better outcomes. We think this is related to structure, but can we measure how the trial structure affects teaming through EHR and messaging?

Network Approaches Using Administrative Data to Understand the Organization and Coordination of Healthcare

Craig E. Pollack, MD, MHS

Katey Ayers Endowed Professor, Department of Health Policy, Johns Hopkins Bloomberg School of Public Health with joint appointments, School of Medicine and School of Nursing

A primary care physician, **Dr. Craig Pollack** shared the story of a sample patient, 69 years of age with a few health concerns, who has just been diagnosed with colorectal cancer. She has made 11 visits to his health system with seven clinicians working in different practices. Based on all these visits, he is inclined to ask: What can be discerned from claims data about her care coordination? How does the relationship between her doctors impact coordinated delivery of care?

He believes that network analysis is salient to evaluating cancer care, which is not provided in isolation. And many network-analysis approaches align with managed care programs that have come because of reforms. This approach also captures provider referrals, patient choices, and passive choices. Billing may also get at the "messiness" of modern healthcare and variation in how patients seek care.

A study by Barnett et al., he reported, has linked relationship ties from survey data with patient-sharing data from Medicare.[10] If two doctors share about eight or more patients, he believes it's probable there is a real relationship. Dr. Pollack and colleagues found that patient-sharing persists over time when 10 or more patients are shared.

Dr. Pollack reported some "practical" challenges, such as defining network boundaries and understanding which providers will be included. An ever-present issue is how to define a tie. Finally, there are numerous units that can be assessed, along with a patient's network experience.

But Dr. Pollack also highlighted the horizons ahead for network-based analytic and modeling approaches, including studying the emerging patterns within social networks; the adoption of innovation; and, based on lessons learned, the strengthening of weak ties.

Dr. Pollack proposes care density as a novel measure to establish the amount of patient-sharing among the patient's providers. This calculation sums up the total number of shared patients among the doctors seen by a patient and divides this number by the total pairs of doctors seen. His team has found this measure has been associated with several different outcomes.

A Network-based Approach to Identifying Linchpin Cancer Specialists with Claims Data

Erika L. Moen, MS, PhD

Assistant Professor, Department of Biomedical Data Science, Geisel School of Medicine at Dartmouth

With a projected increase in the shortage of oncologists, **Dr. Erika L. Moen** described her project to understand "linchpin" oncologists within a network, which may identify physicians critical for delivery of multidisciplinary cancer care, identify regions vulnerable to workforce shortages, and be used to assess how relationships among oncology specialists impact cancer

outcomes. Importantly, she said, oncologists are associated with both utilization and patient outcomes. Care coordination has also been connected to quality, she noted, but measures are lacking to describe the workforce and capture care coordination. A further challenge, she said, is that oncologist referrals and care are delivered across geographic boundaries. Dr. Moen reported key findings from the literature:

- Low oncologist density is associated with higher cancer mortality rates.[11]

- Greater travel burden to reach oncologists is associated with lower utilization of cancer services.[12]

The purpose of Dr. Moen's research is to enhance the measurement of the oncology workforce by applying network analysis. Traditional measures such as number of providers, unit of geography, and population are supplemented with a measure to recognize the relationships between specialists within a professional network. Factors impacting quality are not just dependent on the individual provider, but also the characteristics of peers. The goals of this study were to:

- Develop a network-based measure to identify physicians critical for delivery of multidisciplinary care

- Identify regions vulnerable to workforce shortages

- Assess how network characteristics impact cancer outcomes

Using Medicare data on beneficiaries with diagnoses of breast, colorectal, or lung cancer, Dr. Moen's team selected cohorts of patients who had interactions with care providers within 3 months prior to and 12 months following diagnosis. Her research team then developed the patient-sharing network among specialists and applied weighting to the connections, based on the number of patients shared.

Dr. Moen applied a linchpin score that ranks an oncologist "high" in the absence of physician ties with another oncologist in the network, meaning this network is vulnerable to disruption if the linchpin leaves the practice. The types of patients seen by linchpins tend to be more non-white, Hispanic, and rural, and they tend to have lower socioeconomic status. Patients seen by linchpin oncologists also often have worse survival rates. For example, lower radiation oncology density (per capita) and higher radiation oncology network vulnerability correlate to lower utilization of the therapy.

From a bird's eye view of the United States, network vulnerability by hospital referral region is present when there are more linchpins than expected. In some cases, areas considered dense with oncologists become vulnerable when patient-sharing linchpin scores are considered.

Using Medicaid and Other Data Sources to Examine Coordination of Comprehensive Care for Children and Young Adults with Cancer

Lisa C. Lindley, PhD, RN, FPCN, FAAN

Associate Professor and Nightingale Endowed Faculty Fellow, College of Nursing, University of Tennessee, Knoxville

Dr. Lisa C. Lindley drew on her experiences studying challenges to cancer care coordination for children and adolescents in hospice care to spotlight gaps in measures and data elements that could capture these teamwork activities. She noted that most of the 12 National Quality Forum–endorsed measures refer to outcomes (e.g., timely use of care). Additionally measures don't cover youth stays in palliative/hospice care, which average about 83 days of Medicaid enrollment.

Her team is planning to access Medicaid inpatient and pharmacy data to learn more about the program's mandated care coordination process for children/adolescents in concurrent hospice care. The study will also retrieve U.S. Census Bureau, Agency for Health Research and Quality Social Determinants of Health, and National Death Index resources. The cohort will be a national sample of children aged 21 and younger who were enrolled in the Medicaid hospice benefit.

The research will adopt definitions of care coordination structures defined in state regulations, including medical and hospice care teams, hospice team only, and hospice nurse only. Outcomes of interest that can be derived from Medicaid data include polypharmacy risks, infections, hospitalizations, and duplication of services. Outcomes can also be derived from Medicaid provider manuals on how regulations and regulatory changes affect care team composition and functioning.

Dr. Lindley conceded there are limitations to using administrative data, including a lack of common data elements, limited validation of coordination measures, and claims data that are limited to billable providers and lack of granularity. Nonetheless, she also believes the opportunities to advance data science for this population are terrific, such as developing common data elements. The upside also includes meaningful opportunities to evaluate current measures to fill gaps, test and validate measures, apply machine learning or natural language processing to generate measures, and create microsimulations when data sources are lacking.

More information on the National Quality Forum and care coordination can be found at:
[NQF: Care Coordination Endorsement Maintenance (qualityforum.org)](https://qualityforum.org)

Panel Forum

Chair & Moderator:

Michelle Doose, PhD, MPH

Program Director, Office of Cancer Survivorship, NCI

Question for Dr. Moen: Do you consider how linchpin status affects care quality in addition to network vulnerability?

> **Dr. Moen:** Yes, we are working on some models where the outcome measure will be quality indicators. With linchpin departure, that's when we would expect to see worsening quality of care.

Question: What, in your opinion and based on your research, are some key questions that must be answered or challenges that need to be addressed to improve the measurement of cancer care team structure or coordination functioning, using claims data?

> **Dr. Pollack:** I am interested in the interplay of formal and informal structures involved in the way these networks come together. There are opportunities to get at the more formal structures, such as the horizontal and vertical linkages of providers through their practice structures. And there's the spillover at the edges, where patients are switching providers during their cancer care, which has implications for care coordination.

> **Dr. Moen:** When analyzing claims (billing) data, we are missing some of the advanced providers that are serving the patients. If we can't link them to the patient, then we should link them to the attending physician. This is important for thinking about interprofessional teams and also nonphysician providers that are contributing care.

Dr. Lindley: We are mindful that measures are geared for adults, so we continuously act to find measures that work for pediatric patients. However, we are attempting measures for polypharmacy, because pediatric patients at the end-of-life are receiving an average of 20 medications. Challenging the definitions of measures in a scientifically sound way is something we should do.

Dr. Pollack: Developing social factors is a good complement to administrative data, and efforts are being made to get them into EHR. Social data can also be obtained through structured screening.

Question: How are providers under the concierge model being assessed for care coordination and outcomes?

Dr. Pollack: Seeing these providers would depend on traces in the administrative data, such as billing and reimbursement, even if the provider is out of network. If the patient doesn't incur billing, however, that would be a hole in the data.

Question: What are the challenges of understanding the validity and reliability of network measures?

Dr. Moen: Dr. Pollack's presentation highlighted some of the decisions that go into creating the networks, and you have to think critically about these decisions when you are assembling the network to avoid introducing biases or artificial boundaries. For the latter, you want to run an area-level analysis to attribute providers and patients to an area. In terms of validating measures, my project will be incorporating qualitative data into the network analysis to validate at least the linchpin concept. So mixed-methods work may be useful as secondary analysis to gain insight on the network measures.

Dr. Pollack: This type of network analysis requires a lot of somewhat arbitrary decisions. There is neither a gold standard nor a natural cut-off point for the decision one way or the other. Along with checking the data involved in our decision-making, we are trying to test the robustness to alternate specifications. This gives me confidence that what we find is actually true.

Question: How practical or useful are these network measures, specifically national data sets, for payers, healthcare organizations, and policymakers?

Dr. Lindley: There is a 2-year process for obtaining and cleaning the Medicaid data and a steep cost, so work involving these data sets must be funded.

Dr. Pollack: Some of the data we have referenced are included in risk adjustment software. One approach is to take these data on a subset of high- and low-quality providers and use it in an observational way in conjunction with information on the ground to say who's important (e.g., clinical excellence). In the future, one can see best practices including these types of approaches.

Dr. Moen: There is an opportunity for health systems to use their own data, perhaps applying the measures as part of learning systems to track team structure or composition. In addition to communications, you can also assess patient-sharing within the health system. At the regional or national level, there are barriers, but I would love to get the data and track network vulnerability annually. If Centers for Medicare and Medicaid Services wanted to do that, I would love to.

Breakout Sessions

Attendees were asked to respond to key questions on challenges and opportunities in the three areas of focus, using an interactive Mural board format.

Survey and Qualitative Measures and Methods

Facilitators:

John Mathieu & Sandra Mitchell

What challenges do we face in this topic area?

The top three answers were:

- Getting sufficient clinician response rates
- Integrating survey and qualitative data in meaningful ways
- If we're trying to survey a team, what percentage of the team is enough?

What are some future research opportunities?

The top three answers were:

- Rather than technology being a barrier, leverage technology to address coordination challenges
- Identifying minimum key factors for improving care
- Integrating survey and qualitative data in meaningful ways

EHR-based Measures and Methods

Facilitators:

Nicholas Faris & Veronica Chollette

What challenges do we face in this topic area?

The leading answers included:

- Measuring inter-team (between different teams) interactions
- Communication overload
- Retrofitting EHR data that are not meant to measure teamwork
- EHR data can be messy and unreliable, inaccurate (even structured data)
- Lack of psychometrically valid measures for teamwork
- Outcome- rather than process-focused
- Different modules for activities may require different levels of access to EHR, VHA Corporate Data Warehouse data
- (Relevant) outcomes can still be difficult to measure

What are some future research opportunities?

The leading answers included:

- EHR interaction load – How does it impact outcomes?
- Connect EHR-based measures of teams with differences in clinical outcomes
- Track EHR measures/outcomes that are most salient to teams (or use proxy measures)
- Develop and publish teamwork metrics in the EHR (and figure out how to compute them)
- Use PCORnet networks (https://pcornet.org/)
- Require interoperability across vendors

Population and Claims-based Measures and Methods

Facilitators:

Michelle Doose & Sallie Weaver

What challenges do we face in this topic area?

The leading answers included:

- Hard to study transitions in care; this has come up several times
- Varied skillsets are necessary to bring the full picture together
- Inherent lag between receipt of coordinated care and outcome measures
- Measuring coordination during the survivorship care phase
- Cost of data
- Fragmented data sources – How to "see" the entire picture?
- Time lag of claims data sets and linkage availability (e.g., Medicaid)

What are some future research opportunities?

The leading answers included:

- More linkages like Surveillance, Epidemiology, and End Results (SEER)-Medicare, but with other data sources (e.g., patient experience, social determinants of health measures)
- Making Medicare Advantage linkages more accessible
- Opportunities to connect with other disciplines (e.g., computer science)
- Application of Natural Language Processing (e.g., using it to classify providers or other aspects of variable creation)
- Opportunities to study validity/reliability of network indices
- Use measures to identify health inequities and to potentially inform policy

What Connects Us: Theory and Methods to Advance Teaming and Coordination Science in Cancer Care

Ingrid Nembhard, PhD, MS

Fishman Family President's Distinguished Professor, Professor of Health Care Management, and Professor of Management (Organizational Behavior), The Wharton School, University of Pennsylvania

Referencing the day's presentations, **Dr. Ingrid Nembhard** forecasted where efforts to advance the science of teams in healthcare delivery might go. Her intent, she emphasized, is not to turn away from the past, but to add "what connects us" into the picture. This, she emphasized, starts with asking, "How do we define who's on the team?"

In an increasingly complex cancer care environment, Dr. Nembhard reflected, teams no longer have the benefit of defined boundaries. Not only are individual teams internally fluid, she said, but multiple teams interact as the care journey progresses. She celebrated these evolving connections as opportunities to study the multidimensional nature of teaming behaviors and "emergent" states.

Integration research, she observed, has often focused on finding structural or financial solutions, even when evidence says these may not bolster teamwork. Instead, she proposed, a broader inquiry should consider the psychosocial traits that advance or inhibit teams. She also stressed that "integration" and "coordination" are different things. The first is an "extent to which functions and activities are coordinated,"[13] while the latter is "the process of interaction."[14] For example, collaboration serves as one vehicle to achieve integration, she added.

There's no one perfect study method or instrument, she cautioned, whether it's the tried-and-true survey or new tech, such as wearable data sensors. Instead, she recommends applying mixed methods—including archival resources, EHRs, big data—and connecting findings from the chosen methods.

Dr. Nembhard encouraged investigators to establish the validity of their work and explore which measures can connect past or present work to future endeavors. Other areas for exploration include understanding more about complex "constellations" of networks, the dynamism and content of network ties, and how interventions can leverage networks.
Dr. Nembhard recommended researchers follow a three-step approach:

1. **Adopt a relational coordination perspective.**
   In order to have quality in cancer care, the relational and social dynamics "matter."

2. **Utilize network theory, concepts, and analysis.**
   This analysis seeks to understand the relations between actors and their connections, including any holes. Networks have "levers," such as size, density, embeddedness, tie strength, and brokerage.

3. **Reflect the multilevel, multilayered nature of care.**
   In addition to macro influences, the micro-ecosystem impacting care is considered at the practice level, as well as intra-industry and inter-industry linkages.

Citing her proposed study on a small, centralized network, Dr. Nembhard discussed how a patient's cancer diagnosis triggered the need for a new network of provider ties. This compelled the primary physician and the patient to become "brokers" of the patient's care. She asked, "Can a care coordinator/patient navigator, or perhaps EHR, help fill these holes?"

When teamwork is presented to practitioners as innovation, we also apply network theory, Dr. Nembhard disclosed. Important considerations include measure practicality, ease of use, data interpretation, and linking theory with outcomes. With the collected data, a path to intervention can be charted, while also delivering accountability, predictability, and common understanding.

Citing COVID-19 efforts by joint health organizations to access equipment, and the Veterans Administration's response to Hurricane Katrina, she contended that networks are everywhere. An accompanying slide asked, "Can network research help us understand integration for grand challenges like cancer care?" The answer is "Yes!"

Questions for Dr. Nembhard and Answers

Question: The EHR is functioning as a team member itself. How do you see this being examined, using the network analysis that you describe? Is there a place for understanding that in this method?

> **Answer:** What if we thought about the EHR as an actor? And we think about who's accessing the EHR and what's transmitted through those ties. Perhaps we should put a computer icon in our social team diagrams. It occupies a role, and we need to be tapping into it.

Question: Thinking about awareness and skills, what might be the role of measures for self-assessment?

> **Answer:** While teaching about team effectiveness to an interested organization, we asked participants to self-audit their behavior within teams. We're finding if teammates reflect, perhaps in the last 10 minutes of a meeting, they function better and implement more creative ideas.

John Mathieu, PhD

As a social scientist, **Dr. Mathieu** intended to talk about his work advancing the multiteam systems concept—and to express his pride in how these ideas have "taken off" in cancer care. But the keynotes motivated him to introduce an academic concept, called "dynamic centrality" or the central focus of care at any given time (sometimes referred to as quarterbacking). Dr. Mathieu noted that the focal point of care (i.e., the person who is quarterbacking) may shift as patients progress along their cancer care continuum. It is also the case that the "care coordinators" (both members of the healthcare system tasked with facilitated handoffs and members of the patient's home network) may change over time.

Dr. Mathieu shared that he was diagnosed with a form of blood cancer 3 years ago, through a consortium system. The treatment plan pivoted once a new chimeric antigen receptor T-cell immunotherapy was approved by FDA. He also shared that just before this workshop appearance, his latest PET scan found him to remain cancer free. He noted that the focus of his treatment shifted from his primary doctor to his local oncologist to a distant oncologist where his treatment was administered, and then back again during his recovery. Many handoffs went well and were often facilitated by his care coordinator, who was responsible for the liaison between the facilities and the patient. Other times, technology and information systems proved to be a challenge. Person-to-person real-time contacts were often required to coordinate actions. He conveyed that he and his wife sometimes became the brokers between different nodes in the network. He encouraged researchers to look at these brokerages as patients who move between entities. These bridges are the critical coordination points to consider in improving the process, he concluded.

Nicholas Faris, MDiv

Inspired by Mr. Pivor and Dr. Mathieu, **Mr. Faris** was reminded of a colleague who, during a data presentation, implored him to stop talking about "data," and remember that those numbers represent people. Today, we have been talking about how to measure human interactions, occurring in fluid multilevel systems, he said, and team composition, such as the patient–caregiver unit. The application of mixed methods to solve complex problems, he added, is also encouraging. By keeping the patient centered in all we do, he summarized, we can link these team measures with clinical outcomes.

Sallie Weaver, PhD, MHS

Dr. Weaver highlighted areas offering expansion for methods and measures development, such as survivorship, advanced disease, and end of life. This meeting, she said, has highlighted opportunities to think about patient-centric network analysis and longitudinal analysis. She also called for further theory elaboration to guide measure and method development and adaptation. And she looked forward to measures and methodological approaches that might shed light on the influence of payers and other external factors on cancer team composition and function. Accordingly, she encouraged the audience to leave with a commitment to address the gaps and opportunities that were discussed during the day.

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