A. Title Page

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301-427-1515</td><td>Funding for this conference was made possible [in part] by R13HS028375 from the Agency for Healthcare Research and Quality (AHRQ). The views expressed in written conference materials or publications and by speakers and moderators do not necessarily reflect the official policies of the Department of Health and Human Services; nor does mention of trade names, commercial practices, or organizations imply endorsement by the U.S. Government.</td></tr>
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B. Structured Abstract

Purpose: The purpose of this conference is to develop an ED-specific framework to study communication in the diagnostic decision-making process through consensus methods with a robust team of relevant stakeholders (i.e., physicians, nurses, patients, caregivers, administrators). The long-term goal is to reduce diagnostic errors in the ED by improving communication among patients, clinicians, and other members of the diagnostic team.

Scope: In the Emergency Department (ED), communication among patients, clinicians, and others is needed to diagnose ailments, but the role of communication in contributing to or reducing diagnostic errors is not well known. We will investigate existing frameworks and adapt them to the ED setting by obtaining consensus around one unifying framework in collaboration with frontline providers (physicians, nurses, etc.), patient representatives, and national experts on patient safety.

Methods: We used the eDelphi process, which is built on the principles of the Delphi process but conducted electronically to gather information without bringing participants together physically, an important distinction as this conference took place during the COVID-19

Results: The results of four rounds provided validation of the new framework and ideas for communication-focused interventions that should be either developed or tested for effectiveness in preventing diagnostic error in the emergency department.

Key Words: Communication, Diagnostic Process, Emergency Department

C. Purpose:

In the Emergency Department (ED), communication among patients, clinicians, and others is needed to diagnose ailments, but the role of communication in contributing to or reducing diagnostic errors is not well known. The purpose of this conference was to develop an evidence-based framework investigating the impact of communication on the diagnostic process in the ED. We investigated existing frameworks and adapted them to the ED setting by obtaining consensus around one unifying framework in collaboration with a diverse panel of stakeholders, including physicians, nurses, patient advocates, and consultants.

D. Scope:

Medical diagnosis is one of the most difficult cognitive tasks for the human mind, and the inherent uncertainty of the diagnostic process makes it highly susceptible to errors. Clinicians working in emergency departments (EDs) are particularly vulnerable to making diagnostic errors, because decision making occurs in a time- and information-constrained context. There are ~130 million annual ED visits in the U.S. A conservative estimate of diagnostic error present in 5% of visits translates to ~7 million cases of ED-based diagnostic error per year, with nearly half having the potential for patient harm.[1]

The National Academies of Sciences, Engineering, and Medicine (NASEM) defined diagnostic error as "the failure to (a) establish an accurate and timely explanation of the patient's health problem(s) or (b) communicate that explanation to the patient," thus underscoring the importance of **communication** as an integral component for improving diagnostic quality. In addition, members of our team have contextualized the NASEM framework to the ED setting, which also recognized communication as necessary for diagnostic safety. However, the explicit role of communication in diagnostic processes, as well as the impact of suboptimal communication on patient harm, remains under-investigated.

Communication breakdowns can occur at multiple levels and at varied points during the patient's diagnostic journey in the ED. Patients arriving via ambulance often have no previous relationship with the transporting clinicians, who can base their medical decisions only on what is being told to them or what they observe. Once in the ED, patients may not be able to accurately communicate their symptoms or history to clinicians for a variety for reasons (e.g., low health literacy, mistrust, language barriers). The quality and quantity of **communication between providers** also has a direct impact on the diagnostic process. For example, ED nurses gather data relevant to the diagnostic process but may prioritize, interpret, or convey information differently than physicians, which can further hinder effective diagnostic decision making. As a result, an alternative conceptualization of communication may be especially relevant. Although communication has been broadly construed as information exchange, it also consists of developing shared understanding between communicators to generate an effect or action. In this way, communication between two or more people creates a shared reality and possibly new knowledge that did not exist before they talked to one another.

Our long-term goal is to reduce diagnostic errors in the ED by improving communication among patients, clinicians, and other members of the diagnostic team. Our recent systematic review revealed no existing framework or intervention for investigating communication failures in the ED context, thus inhibiting testing in a methodical manner. [2,3,4,5] The purpose of this conference is to develop an ED-specific framework studying communication in the diagnostic decision-making process. To build a robust communication framework, we will investigate existing frameworks and adapt them to the ED context in collaboration with all relevant stakeholders (i.e., physicians, nurses, patients, caregivers, administrators).

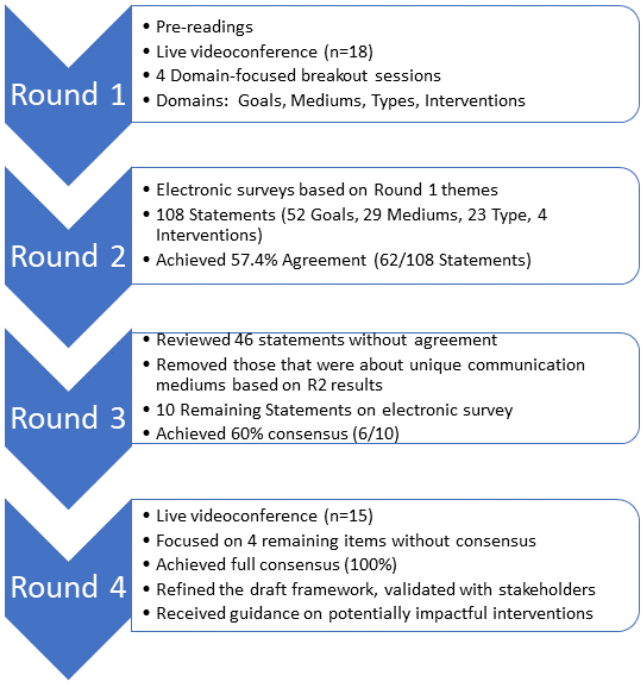
Setting and Participants: We conducted our conference using virtual technology (Zoom). We conducted the conference with a diverse panel of stakeholders (n=18), including physicians, nurses, patients and family members, and consultants, to come to consensus on an evidence-based framework to describe the relationship between communication and the diagnostic process in the ED.

E. Methods:

We used an eDelphi process, which is built on the principles of the Delphi process but is conducted electronically to gather information without bringing participants together physically, an important consideration in the COVID-19 pandemic era. The Delphi process is suited to a large group yet able to draw out the opinions of those who otherwise would remain silent. Our choice of the Delphi method was based on the numerous strengths of the process that include avoiding anonymity dominance by using questionnaires, allowing individuals to change their opinions through a process of iteration that occurs in "rounds," revealing distributions of the group's responses via controlled feedback, and generating summary measures of the full group (via statistical group response) to express judgment, giving more information than just a consensus statement.

To ensure a representative panel, we queried the research team, ED clinicians, and patient advocates (patients, family members) to determine which stakeholder groups we needed to include. We agreed that patient advocates, clinicians, sub-specialty consultants, safety and communication experts, paramedics, and allied health personnel should be included. We then identified appropriate participants in these domains for the conference using publication records, professional connections, and our network of health system research partners. We also invited program officers from the Agency for Healthcare Research and Quality (AHRQ), the conference funder.

Figure 1: Iterative reactive eDelphi method rounds and findings



Our eDelphi process proceeded through four iterative rounds (Figure 1) until consensus was reached. The threshold for consensus was set a priori at 80% or higher agreement among stakeholders.

The pre-conference webinar was held 3 weeks before the round 1 videoconference. The purpose of the pre-conference webinar was to introduce participants to the goal of the conference, main concepts, or themes (e.g., ED focused, diagnosis, communication) and deliverables that we hoped to achieve by the end of the round 1 meeting. During the pre-conference webinar, we provided a brief overview of the agenda for round 1 and associated activities and performed technology checks for the applications, such as Miro and Zoom, that the participants would use in the eDelphi conference.

Once the time and date were set, we sent participants some preparatory work to set the stage for round 1. Instead of just sending a packet of research articles, we sent participants a reading guide to allow readers to engage with the material in a meaningful way and learn from it. The reading guide consisted of a citation, short (1-2 sentences) summary, abstract, and link to the full publication for each article. We categorized articles based on the various stages of a patient's journey through the ED into three broad areas: the state-of-the-science on the intersection of communication and diagnosis specifically in the ED setting, conceptual frameworks that have been used, and supplemental readings that consisted of handoffs/care transitions, education/training focused papers, and work system barriers and facilitators. The reading guide had the additional benefit of level-setting across the different groups of stakeholders.

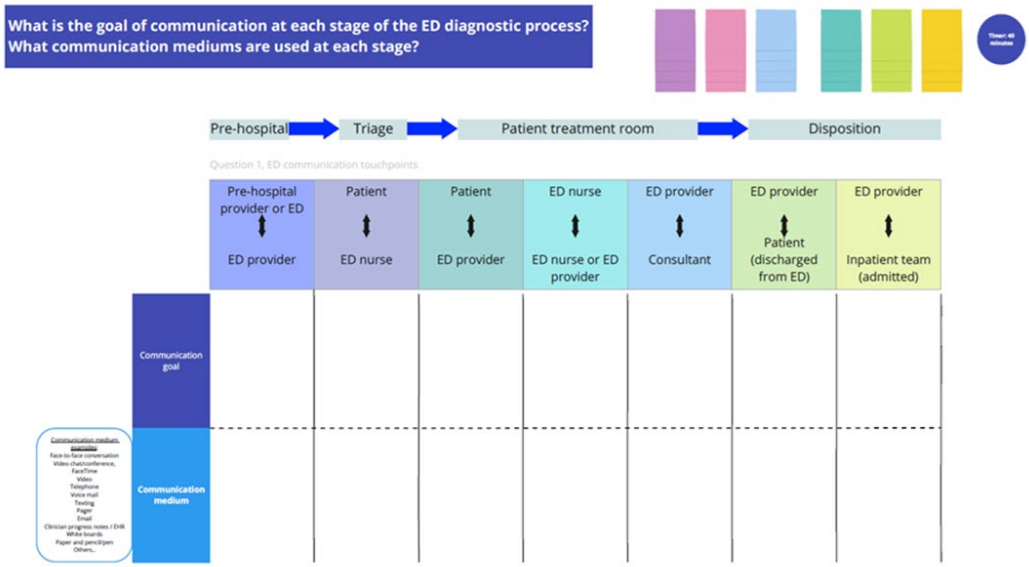
During round 1 of the eDelphi process, we convened the entire group on a secure videoconferencing platform (Zoom) to solicit panelists' opinions on preventing diagnostic errors using communication in the emergency department in an open-ended manner. Rounds 2 and 3 were conducted using electronic surveys, and a final group consensus panel occurred on Zoom for round 4.

The round 1 videoconference was intentionally open ended. We began round 1 by presenting a brief set of slides describing an overview of the conference and agenda for the session. Participants were assigned to breakout rooms, with each breakout room being led by a trained facilitator and supported by a technology assistant.

*There were 4 pre-conference short courses, which in total drew 178 attendees.

After brief introductions in each breakout room, facilitators led their small group to elicit as many opinions and ideas as possible regarding communication goals, mediums, types at various stages of the patient's journey for achieving an accurate diagnosis and points that are especially vulnerable to communication breakdowns in the ED. A concluding group session asked participants to consider ways that communication contributes specifically to diagnostic errors. Participants and technology assistants used Miro to capture ideas (Figure 2).

Figure 2: Example Miro board from a round 1 board.



The research team used conventional content analysis to determine themes and statements that were put forward into electronic survey format in round 2, seeking consensus. All data from round 1 were converted into a series of statements, using four categories that emerged from the round 1 videoconference (communication goals, mediums, types, interventions). Round 2 concluded with all participants returning their electronic survey, and the survey data were analyzed using measures of central tendency (i.e., mean, median, and mode) and dispersion to represent the collective judgments of the expert panelists. Each statement that reached 80% or higher agreement among the panelists was deemed to have consensus.

As a research team, we closely and independently reviewed the statements without consensus after round 2 to see what could be left out or changed for round 3 (see Table 1 for examples of statements without consensus). As an example, we found that a chat function and other communication mediums are not unique to any one role or dyad. For instance, the statement, "Communication mediums unique to the ED Nurse to ED nurse or ED nurse to ED Provider encounter are - Texting on phone," was deemed irrelevant, because texting is not unique to nurses or providers. At the end of this iterative process, there were 10 statements remaining that did not meet our 80% threshold for agreement and that necessitated further discussion in the next survey round. In the round 3 electronic survey, participants were reminded of their previous responses and asked for their level of agreement on the statements unresolved from the previous round, consistent with Delphi methodology. There were free-text responses permitted in this final electronic survey round to contextualize the findings.

The final Delphi round held over zoom (round 4) consisted of an in-depth discussion on the remaining statements without consensus and brainstorming communication-focused interventions to reduce diagnostic error. The transcripts and field notes from the round 4 videoconference analyzed using conventional content analysis to reveal common themes that inform the final framework.

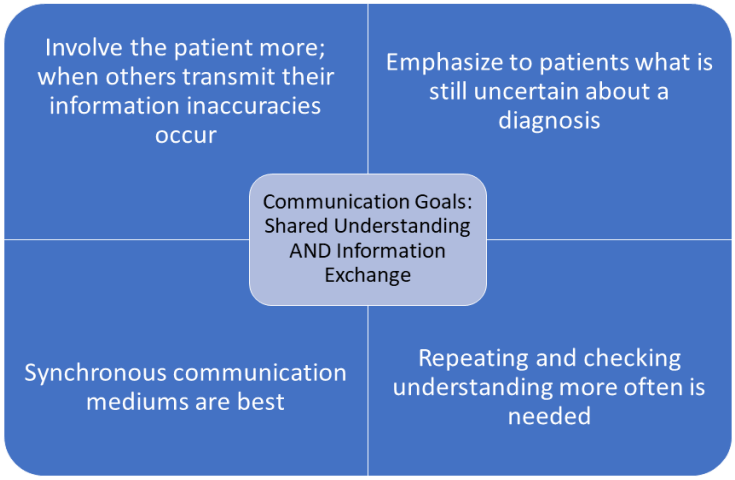
Limitations: There are several limitations to our approach. Although our panelists represented a national sample of ED stakeholders, there may be perspectives that were not included. Research team members were all from a single academic medical center, so other academic medical centers and community EDs were under-represented, limiting the generalizability of our findings. However, our methodology is easily reproducible to allow other EDs to validate our findings.

F. Results:

Round 1 was 4 hours in length and was conducted on a secure videoconferencing platform (Zoom). By the end of round 1, participants had provided input on four broad themes, according to each stage of a patient's journey through the ED: (1) goals of communication, (2) communication mediums that are used, (3) types of communication (i.e., information exchange or shared understanding), and (4) where breakdowns in communication typically occur. We categorized all the ideas into a table, combining the four broad themes with the various stages of the patient's journey. For the fourth theme, we were interested in looking ahead to how we could develop interventions to improve communication and reduce diagnostic error in the ED. Statements in the last row reflected getting opinions on developing interventions, depending on where a breakdown in communication could occur.

There were 108 statements that emerged from round 1 and that were placed into an electronic survey, which was first pilot tested for content, readability, and face validity before sending to participants via email. There was consensus on 62 of the 108 statements (57.4% agreement) in round 2 (Figure 3). Participants also provided free-text comments to contextualize their responses. We reviewed comments and paid attention to those that mentioned confusion in any statements that inhibited a participant's ability to make a decision to agree or disagree (e.g., "Some of the items were a bit confusing and I chose the neutral option for those," or "I did not always understand what was being asked").

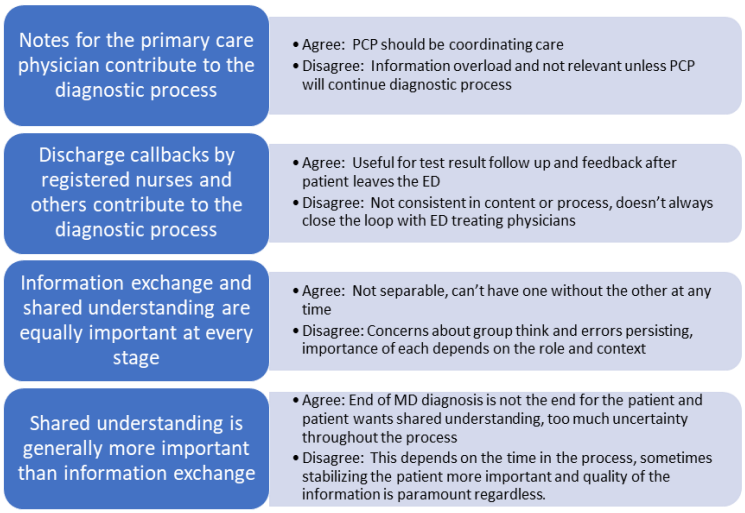
Figure 3: Insights after rounds 1 and 2



In general, by the end of round 2 participants agreed that goals of communication that were associated with diagnosis were important at every stage of the patient's journey through the ED.

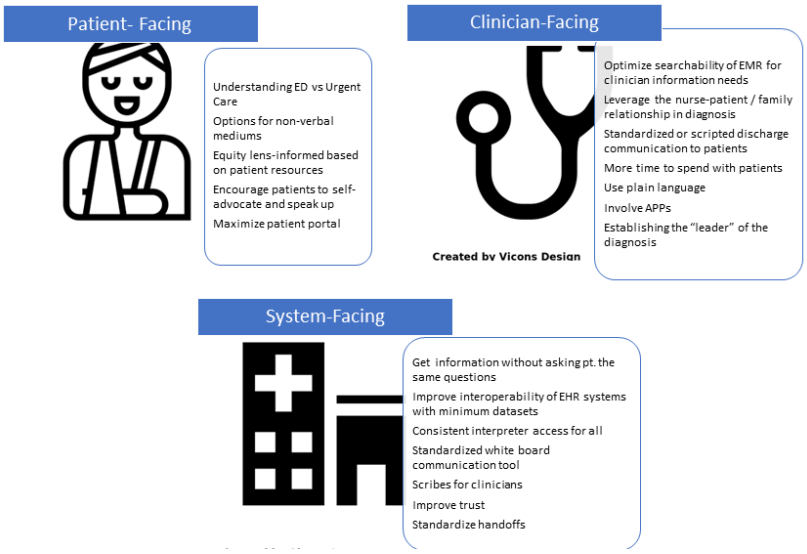
There were 10 statements on the round 3 electronic survey. Consensus was reached on six of the 10 statements in round 3. The research team discussed the elements where we did not have consensus (Figure 4) to determine whether they should be removed or earmarked as needing more information. We determined that we needed more information on all four of the statements where we did not have consensus. Other insights from round 3 emerged as well and these included that both types of communication (information exchange and shared understanding) need to be called out in the framework although both are not necessarily needed at every stage of the journey or in equal measure, and that discharge call backs to patients from registered nurses may be peripheral to the diagnostic process. One participant told us, "I…could see situations where it could help with the diagnostic process but not sure that is always true or even true most of the time."

Figure 4: Statements without consensus after Rounds 3 and 4 conference conclusions.



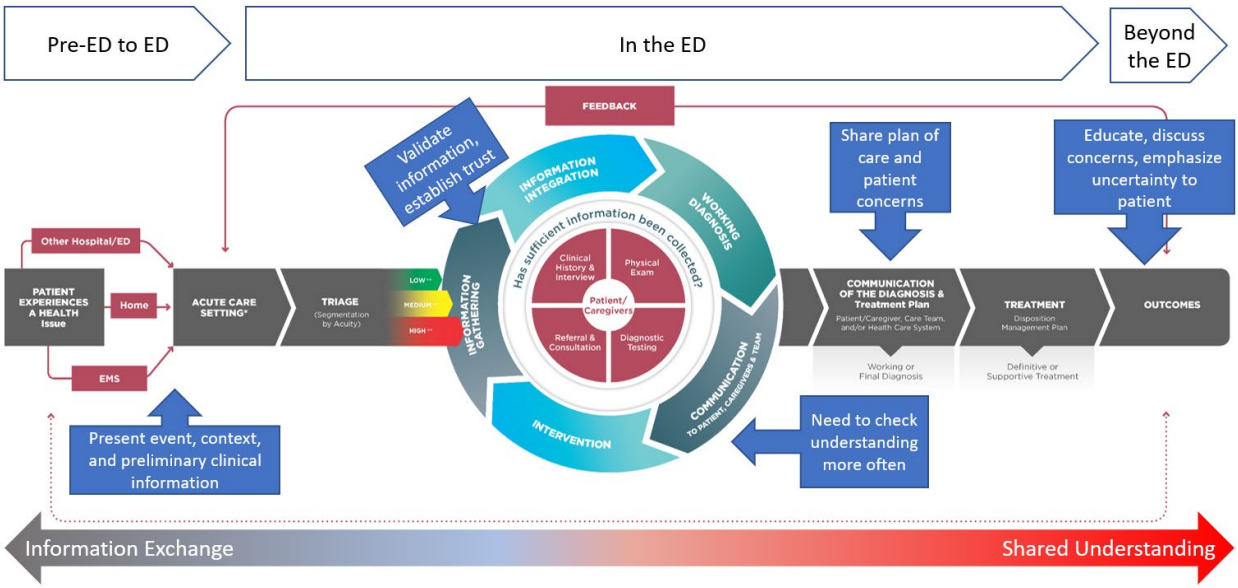
Outcomes: The results of round 4 were validation of the new framework (Figure 5) and ideas for interventions that should either be developed or tested for effectiveness in preventing diagnostic error in the emergency department (Figure 6). We next plan to co-design interventions with patients and frontline providers and test them via rigorously designed, prospective, multicenter trials.

Figure 5: Expert Panel Ideas for Communication-Focused Interventions from Round 4 Discussion



There are several important facets of this new framework that will allow for future intervention-focused research to examine the influence of communication on the diagnostic process in the ED. Our panel validated that interventions should be context specific, suggesting that different interventions may be needed when the patient is in the pre-hospital setting, when inside the emergency department, and after the patient has left the emergency department. The goals of communication are different as the diagnostic process unfolds. Information exchange and shared understanding coexist throughout the process but may have differential influence depending on where the patient is in the emergency visit. Shared understanding becomes more important as discharge from the emergency department is imminent. The quality of the partnership between patients, families, and clinicians is influential throughout the diagnostic process. Patients are more likely to share their stories if they have a good relationship with clinicians, which allows the patient to feel like a partner in the diagnostic process rather than as a passive recipient of care. As the quality of the partnership improves, trust develops.

Figure 6: Final Communication Intervention-Focused Framework



As a diagnosis is formed, it is important to flatten hierarchies among clinicians and between clinicians and patients in order to obtain and exchange information and promote shared understanding.

Discussion:

We conducted an AHRQ-supported conference to develop and validate a framework that integrates all potential opportunities for communication to mitigate diagnostic errors in emergency departments. Our new framework builds upon the NASEM[6] and ED-specific framework[19] to include communication-focused interventions for the first time. There are several important facets of this new framework that will allow for future intervention-focused research to examine the influence of communication on the diagnostic process in the ED. Our framework is well aligned with a recent research priority setting exercise, which helps to provide consistent guidance for the advancement of science in this area.

As a result of participating in our conference using the eDelphi methodology, panelists had many insights into potential interventions that could be tested to improve communication related to diagnosis throughout the encounter. For example, our panel validated that communication interventions should be context specific, depending on where the patient is in their journey through the ED. Different interventions may be needed when the patient is in the pre-hospital setting, when in triage, during the ED stay, and after the patient has left the ED. For instance, communication during the pre-hospital phase or in triage may require greater shared understanding to fully comprehend the patient's story. During the ED stay, information exchange may be prevalent, as data are gathered from various tests and procedures to help arrive at a diagnosis. Moreover, communication interventions likely need to focus on patients, clinicians, and the systems in which they will go through the diagnostic process in equal balance.

The location of the encounter is important. The ED is known to be a highly complex and chaotic environment and a possible source of great anxiety to patients. Yet, efforts to reduce patient anxiety and ensure that patients comprehend what is being told to them are lacking. Noise levels, bright lights, sudden sounds, noxious smells, and frequent interruptions all characterize the ED environment and are known to influence communication, but interventions to buffer the effects of these factors do not exist.[6,7,8] The majority of communication interventions focus almost exclusively on the handoff process between clinicians, neglecting to incorporate input from patients and family members.[9,10,11,12,13,14,15] They are also acontextual, as if communication occurs in a vacuum.

Next, the goals of communication are different as the diagnostic process unfolds. Information exchange and shared understanding coexist throughout the process but may have differential influence, depending on where the patient is in the emergency visit. Shared understanding becomes more important as discharge from the emergency department is imminent. Unless the patient understands discharge instructions, they are at risk of returning to the ED, possibly more acutely ill than before.

Finally, the quality of the partnership between patients, families, and clinicians is influential throughout the diagnostic process. Patients are more likely to share their stories if they have a good relationship with clinicians, which allows the patient to feel like a partner in the diagnostic process rather than as a passive recipient of care. As the quality of the partnership improves, trust develops. There is very little time to build a relationship during an ED encounter, yet clinicians know how important it is and demonstrate relationship building using communication techniques such as making frequent eye contact and getting to eye level with a patient, using levity to lighten the mood when appropriate, giving the patient time to express their opinions without interruption, confirming what the patient has said by repeating back, and careful use of body language to suggest openness to whatever the patient has to say. As a diagnosis is formed, it is important to flatten hierarchies among clinicians and between clinicians and patients to obtain and exchange information and promote shared understanding.

Conclusions:

We accomplished the primary objective of the R13 and developed consensus around an ED-specific communication framework focused on communication in the diagnostic decision-making process (Figure 6 above) using eDelphi methodology that included all relevant ED stakeholders. The framework builds on our prior work,[16] R01HS024953, and the communication framework derived in this current work (R13HS028375) will be made available in our primary manuscript. Our ED-specific framework studying communication in the diagnostic decision-making process will be the basis for how we study communication in the ED. By participating in our conference, insights into aspects of the influence of communication and diagnosis that have been previously ignored came to light. The concept of a journey unfolding over time was made explicit and highlighted where communication goals were needed. Nursing's contribution to the diagnostic process has received little attention but emerged during the conference. Finally, the voices of patients and families, for whom diagnosis is most critical, were heard.

Significance:

Our conference is significant for several reasons. First, the diagnostic process has been viewed as an individual pursuit, failing to capitalize on the wisdom of clinician, patient, and family member stakeholders, whose input is critical to optimal diagnosis. Gathering all relevant stakeholders in a consensus-building process highlights that multiple viewpoints are needed to strengthen the diagnostic process. Second, given the rapid uptake of telemedicine during the current COVID-19 pandemic, we need to understand how errors develop related to both face-to-face and digital communication across the processes of care involved in an ED encounter. We lack rigorous evidence of what information should be conveyed, when, and by which channels of communication. We are building on our work (R01HS024953, R18HS026622) with the development of the ED-specific framework studying communication in the diagnostic decision-making process. We will be exploring funding opportunities to examine potential interventions to improve communication and reduce diagnostic uncertainty and potential errors. We will engage AHRQ and Program Officers to discuss potential avenues for funding a real-world setting study to improve communication and diagnostic decision making; a potential aim of a future study will be deploying a to-be-designed intervention and measuring the impact of communication breakdowns on diagnostic quality, with the hypothesis that we may identify breakdowns in communications as mapped to the framework (Figure 6) and provide an intervention to compare pre- and post-intervention data on the potential improvement of quality as measured by reduction in delay or missed diagnosis.

List of Publications and Products:

1. Bettencourt AP, Manojlovich M, Mangus CW, Parker SJ, Skurla SE, Walters HM, Mahajan P. Developing a Framework to Enhance Diagnostic Communication in the Emergency Department. *Pending journal submission*.

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