1. Title Page

Title
Telehealth and Emergency Medicine: A Consensus Conference to Map the Intersection of Emergency Medicine and Telehealth

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2. Structured Abstract

Purpose: The 2020 Society for Academic Emergency Medicine Consensus Conference, “Telehealth and Emergency Medicine: A Consensus Conference to Map the Intersection of Emergency Medicine and Telehealth” aimed to develop a research agenda to support future clinical practice and evidence-based investigation at the intersection of telehealth and emergency medicine.
Scope: Topics explored were: 1) healthcare access, 2) quality and safety, 3) educational needs and outcomes, 4) research facilitation, and 5) impact of telehealth on EM workforce
Methods: The Planning Committee led the pre-conference preparation, supplemented by input solicited from various stakeholder organizations. Planning committee and conference participants included emergency physicians, community partners, educators and researchers with expertise in telehealth, research dissemination and translation, as well as comparative effectiveness, and trainees. All attendees participated in interactive subcommittee breakout sessions, in which they helped to both define and refine research priorities.
Results: Each of the five subgroups generated a research agenda for future research, and these proceedings were submitted for publication in *Academic Emergency Medicine*.

Key Words: telehealth, emergency medicine, research networks, education, emergency medicine services, workforce, healthcare access, quality and safety

3. Purpose

The overarching goal of this consensus conference was to develop a research agenda to support future clinical practice and evidence-based investigation at the intersection of telehealth and emergency medicine. The consensus conference brought together thought leaders and practitioners across multiple organizations that influence telehealth and emergency medicine. The conference included state-of-the-art didactics led by nationally recognized keynote speakers, breakout group planning sessions, and a consensus building process. Specific topics explored were: 1) healthcare access, 2) quality and safety, 3) educational needs and outcomes, 4) research facilitation, and 5) impact of telehealth on EM workforce. The rich discussion strengthened the collaborative exchange of ideas among stakeholders, in order to prioritize research agendas and best practices to lead to improvements in patient care focused outcomes.

In order to achieve the overarching goal, this consensus conference had three specific aims:

Aim 1: Summarize current state of telehealth in Emergency Medicine

Aim 2: Develop actionable educational solutions for telehealth in Emergency Medicine Practitioners

Aim 3: Develop actionable research solutions for telehealth in Emergency Medicine

4. Scope

Telehealth is an innovative application of technology in healthcare: Telehealth is defined as the use of telecommunication technology to provide a broad range of healthcare services and can include modalities such as live video, asynchronous store-and-forward, remote patient monitoring, and mobile health (mHealth). Telemedicine is often used interchangeably with telehealth; however, telemedicine is focused on using telecommunication to improve clinical care whereas telehealth also includes disease management (e.g., remote monitoring of patient glucose), population health, education and other healthcare-related fields. Telehealth is considered by some to be the future of medicine. There is hope that the use of novel communication methods and new telehealth delivery models will increase access to healthcare, improve quality of care, and decrease costs.[1-4] Others argue that telehealth does not decrease the overall costs of healthcare and is inferior to in-person care.[5-7] More evidence is needed to better determine where telehealth can add value to the current practice of medicine.

Use of Telehealth in Emergency Medicine (EM) is increasing and has numerous applications to improve patient outcomes: Widespread adoption of telehealth into EM is increasing. There are regions of the US where EM utilizes telehealth for clinical care, specifically care for rural emergency medicine or remote locations. Using telecommunication technology, experienced emergency nurses and board-certified emergency medicine physicians in the US provide guidance to remote clinicians, whether in the continental US, or to other medical providers or staff in remote locations outside of the US, such as in airline and maritime medicine. These provider-to-provider programs leverage EM expertise to fill gaps in care at sites external to the brick-and-mortar emergency departments (EDs). Telehealth has also been used to provide direct-to-patient (direct-to-consumer or DTC) care via web-based applications. Emergency physicians provide staffing coverage for several of the DTC programs—either as part of their group practice or as independent contractors. Recent telehealth initiatives in emergency medicine include using telecommunication technologies within an emergency department to facilitate the triage process and reduce the time from ED arrival to provider evaluation. This model enables an emergency physician to provide clinical guidance or orders for nurses following a live-streamed video conversation between a patient and the physician. This set-up also enables a physician to help triage at multiple sites, e.g., multiple EDs in the same health care system or multiple triage locations within a large ED. There has been little in the literature describing the emergency medicine use of store-and-forward technology and mHealth; although expansion of remote patient monitoring programs will require physician availability to rapidly assess unexpected deterioration, perhaps a natural role for the EM physician.

Timeliness of a Telehealth in Emergency Medicine Consensus Conference: Given the pressures from patients, payers, and healthcare institutions for improved quality of care, increased access of care, and decreased costs, and the idea that telehealth could provide such a potential solution warrants further study. EM serves as a microcosm of the healthcare system and can provide valuable insight to how telehealth could

solve some of healthcare's current and future problems. It is important for EM to understand telehealth and have a voice at the table when telehealth-related legislation and policies are made. Leadership and coordination among the diverse practice environments and providers in the ED is critical to the success of telehealth as a medium to improve patient outcomes. A robust research agenda will be important to guide the fields of both telehealth and emergency medicine. This Consensus Conference at the national emergency medicine academic meeting will offer a unique opportunity to synthesize a consensus statement and research agenda to support future clinical practice and evidence-based investigation.

5. Methods

The SAEM Consensus Conference is an annual research conference that has been held since 2000 and is intended to generate a research agenda for emergency medicine (EM) topics and is held in conjunction with the annual Society for Academic Emergency Medicine Annual Meeting. The "Telehealth and Emergency Medicine: A Consensus Conference to Map the Intersection of Emergency Medicine and Telehealth" proposal was selected by a competitive review process and approved by the SAEM board of directors.

We used a modified Delphi method[7] to identify and reach agreement among a group of relevant stakeholders in EM and telehealth on key research priorities in telehealth and EM. The nine-step modified Delphi process was used across five breakout groups. This iterative process aimed to reach consensus on the key questions for the breakout topics to be included in the Consensus Conference, as well as eliminate areas that stakeholders identified as lower priority.

The *first step* began in 2016 and included a background literature search and consensus between content experts. This culminated in the five breakout group topics: (1) Educational Needs and Outcomes, (2) Healthcare Access, (3) Quality and Safety, (4) Research Facilitation, and (5) Workforce.

The *second step* began in the Fall of 2019 with the creation of breakout groups. Each group had a content and member solicited via email to the SAEM Telehealth Interest Group list serve. Breakout group leaders led discussion with their members and developed questions in their respective topics via electronic media and conference calls. The breakout group leaders and conference co-chairs determined an overarching conceptual framework did not exist for the large domain of telehealth. Instead, the breakout groups used conceptual frameworks that were applicable to their domains. No limitations or requirements existed for the number of questions generated; however, the planning committee recommended a final 3-5 research questions for each breakout group. The breakout groups submitted to the co-chairs their initial summaries of the state of the science and potential research questions. Co-chairs reviewed the summaries and ensured no overlap occurred.

The *third step* occurred three months preceding the original conference date. Relevant stakeholders within and outside of EM provided feedback on the breakout groups' summaries. Stakeholders were surveyed to provide feedback on the following questions: (1) Are there any subject areas within this topic that are not represented here that you suggest we add, (2) Are there any subject areas within this topic that you suggest we remove, (3) Are there any important resources or seminal research articles that are not listed here, and (4) Any further comments?

Due to the cancellation of the original conference due to the COVID Public Health Emergency, we added a *fourth step* to incorporate any new research or insights from the explosion of telehealth during the COVID pandemic. The breakout group leaders

revised their summaries using the initial stakeholder survey feedback and a virtual conference "Telehealth in Emergency Medicine during COVID: Lessons Learned".[4] A second stakeholder survey administered in July 2020 with the same questions as the first stakeholder survey provided targeted feedback to the breakout groups.

The *fifth step* occurred the month preceding the rescheduled conference date. After the breakout groups revised their summaries with feedback from step four, each preregistered conference participant received all five of the breakout group summaries and a survey asking the participants to rank the importance of the questions developed by the breakout groups. The ranking used a 5-point Likert scale with the following question stem, "As an area of research, the following question is:" with the following potential responses: "not important", "somewhat important", "neutral", "important", "very important". Participants could suggest new questions or gaps and provide comments in a free-text section. Breakout group leaders revised their summaries and research questions in light of the participant feedback from the preconference survey. Prior to the first voting (preconference survey), the Co-chairs determined *a priori* that any question that received >80% responses with "important" or "very important" would remain on the research agenda and the other questions that did not meet this threshold were dropped.

The *sixth step* occurred on Day 1 of the virtual conference. The conference included three keynote speakers who provided different perspectives on EM telehealth. Former SAEM President and nationally recognized telehealth expert, Dr. Judd Hollander, discussed the myths surrounding the use of telehealth. Dr. Bisan Salhi, an EM physician researcher and expert on homelessness and high-utilizers of EDs challenged the participants' assumptions on how to engage those who may be least included in telehealth programs. Aaron Martin, Executive Vice President and Chief Digital Officer of Providence St. Joseph Healthcare provided a snapshot of telehealth use in current progressive healthcare systems.

Along with the keynote presentations, two facilitated panel discussions included a diverse array of stakeholders including patients, providers, and representatives from the American Association of Medical Colleges, National Quality Foundation, Society for Education and Research in Connected Health Society, Telehealth Resources Centers and many others. The panelists provided a broad stakeholder perspective for the conference participants to consider when voting on the research agenda. Patients and patient advocates gave critical patient perspectives on the topic throughout the consensus planning process as well as during the conference breakout group discussions.

On Day 1 of the virtual conference, the breakout group leader led the breakout groups. Due to resource constraints, the Healthcare Access and the Quality and Safety groups met concurrently as did the Educational Needs and Outcomes, Research Facilitation, and Workforce groups. Each attendee participated in two separate breakout group discussions on each of the conference days. The breakout group leader began the sessions with a presentation of the topic and the research questions. Telehealth content experts further described the breakout group topic with short presentations followed by

open dialog amongst the participants. During the pre-conference rehearsals with the breakout group leaders, the planning committee reviewed clear goals and objectives of the sessions and voting to mitigate inter-group variation. The following guidelines were established: each breakout group could not be subdivided into smaller discussion groups, discussions should be managed so that all participants were heard, and priority should be given to the patient and patient representatives.

Scribes documented discussions during the sessions (Scribe America, Fort Lauderdale, Florida). The scribes shared the notes with the respective breakout groups leaders at the end of the live virtual conference days.

At the end of the Day 1 breakout session, participants completed a survey of the breakout group's research questions. Because not all breakout groups were able to discuss each of the research questions, participants of some breakout groups completed a survey on the evening of the first day of the live conference which consisted of current questions, including wording changes discussed during Day 1's breakout discussions.

The *seventh step* occurred on Day 2 of the conference. The same five breakout groups met again, and the breakout group leader led a brief discussion of those items that had not reached >80% in step six so participants could make a case to rescue the questions from being discarded. After that, the floor opened to discussion on the questions that met the 80% threshold. That evening, the breakout group participants completed a survey as a last round of voting on priorities.

The *eighth step* occurred after the conference. The post-conference evaluation included the following question, "Do you have any further feedback or concerns about the final research agenda presented on September 24th?" This question served to surface any disagreement that may not have been captured in the conference day.

The *ninth step* occurred after feedback from the post-conference evaluations were received. The breakout groups revised their summaries according to feedback from the conference day and the post-conference evaluation. The conference planning committee reviewed and incorporated these summaries into these conference proceedings.

6. Results

The preconference survey included 94 candidate items for priority research questions developed by the five breakout groups. Of the 47 pre-registered participants, 38 (81%) responded to the preconference survey (step 5 from Methods) for Round 1 of voting (Pre-conference Survey, Appendix). Most of the preregistered participants came from teaching hospitals (89.5%) in urban settings (68.4%) (Table 1). Most preregistered participants practiced clinical EM (71%). Seventy-one per cent reported that they use or have used telehealth in their clinical practice where only 7.9% reported that they do not use telehealth, nor did they have any plans to create a program. Of the preregistered participants, less than a quarter reported having telehealth training programs for trainees. Participants rated the importance of all questions on the preconference survey and carried forward for the next round of voting.

At the live virtual conference, 93 unique attendees (excluding SAEM staff) participated; 88 attendees on Day 1 and 65 attendees on Day 2. Round 2 of the voting occurred after the first conference day, and round 3 occurred live in the second conference day. Please see Table 2 for the attendance and Table 3 voting response rates for Breakout Group Day 1 and Day 2. Round 2 of voting after Day 1 included 103 research questions and Round 3 of voting included 36 research questions on the survey (Appendix).

For the post-conference survey, we had a 68.9% response rate (64/93). General feedback included the rushed feeling of the breakout group discussions. No participants objected to the final list of research questions. Below are the final 24 questions for the Telehealth in Emergency Medicine Consensus Conference Research Agenda. The ranking used a 5-point Likert scale with the following question stem, “As an area of research, the following question is:” with the following potential responses: “not important”, “somewhat important”, “neutral”, “important”, “very important”.

Educational Needs and Outcomes

Core Competencies and Best Practice

1. What are the core competencies in TH that are common to all providers, regardless of role, specialty, or level of training? (4.36)
2. What gaps, if any, in current EM training need to be addressed to adapt practice to telehealth? (4.45)
3. In patient-provider TH encounters, what are the components of the video-based physical exam? (4.18)

Approach to Education

1. What types of educational experiences and instructional modalities are effective to teach TH to EM practitioners? (3.91)
2. How do we train emergency practitioners in virtual presence (webside manner) for patient-to-provider and provider-to-provider encounters? (4.27)
3. What are the best ways to integrate TH skills into both UME and GME EM curricula? (4.27)
4. How do we train interprofessional EM teams to provide collaborative care via TH? (4.27)

Healthcare Access

Patient-, population-level health outcomes

1. How does emergency TH access vary by patient or population characteristics? (3.86)
2. When considering the impact of TH for improving access, what are the appropriate patient-level outcomes to evaluate? (4.57)
3. When considering the impact of TH for improving access, what are the appropriate population-level outcomes to evaluate? (4.38)
4. What are costs and cost-effectiveness of TH from the perspective of the patient and the system, and relatedly, what is the appropriate approach to differentiate value of increased access vs excessive low-value utilization? (4.19)

Quality of healthcare delivery

1. Among underserved populations, what are mechanisms by which disparities in emergency care delivery may be exacerbated or ameliorated by TH? (4.14)

Outcomes of the telehealth encounter and program

1. What are the barriers and facilitators of implementation of TH in EDs (e.g., barriers such as payment models or healthcare delivery systems)? (4.05)

Implementation process measurements

1. What lessons can we learn from the expansion of TH during the COVID-19 pandemic? (3.95)
2. What are the barriers and facilitators to improving access via TH and quality of care for underserved populations? (4.43)

Quality and Safety

1. How can TH be used to augment safe transitions of care? (4.08)
2. In what situations should the quality and safety of TH be compared to in-person care and in what situations should it be compared to “no care”? (4.38)
3. In which clinical conditions, populations, and settings does emergency TH improve patient and operational outcomes? (4.77)

Research Facilitation

1. How can/should TH be used for research facilitation, including recruitment, informed consent, reducing attrition, and data collection, for EM research? (4.25)
2. Which individuals or populations require special considerations as the role of TH in EM research is expanded and what are the key barriers for engaging these patients in TH-facilitated research studies? (4.30)

Workforce

1. How effective can TH be as a solution for hospitals, particularly rural and critical access, that are unable to staff with board-certified EM physicians at the bedside? (4.43)
2. What types of training will be required for current practicing providers? (4.14)
3. What kinds of staffing will be best suited for emergency TH in different settings (e.g., APP versus rural physician, rural versus urban, etc.)? (4.14)

4. What kinds of staffing and systems are required to ensure provider efficiency in emergency TH? (4.14)

7. List of Publications and Products

The conference proceedings manuscript has been accepted for publication by *Academic Emergency Medicine*.

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