NUSTL
NATIONAL URBAN SECURITY TECHNOLOGY LABORATORY

SAVER TechNote

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# AI-FACILITATED EMERGENCY MEDICAL SERVICES CALL CENTER SOFTWARE

*AI- facilitated emergency medical services (EMS) call center software leverages legacy technologies along with the addition of Artificial Intelligence (AI) systems to support first responders in the events unfolding during a medical emergency. Through advancements in computing, AI technologies may shift how EMS call centers operate, and could create a more reliable and efficient triaging process. This technology falls under FEMA AEL number 04AP-010-CADS, titled "System, Dispatch, Computer Aided."*

## Overview

AI-facilitated emergency medical services software is a powerful data integration tool that uses advancements in computing to guide emergency call center dispatchers in determining status, condition, and real-time recommendations for patient care and disposition in the field [1]. Customizable platforms can be used by dispatch centers to prevent unnecessary emergency room visits, rapidly detect life-threatening situations, strategically allocate resources, and provide detailed location information to those responding. In partnership with EMS departments, algorithms can help detect critical medical emergencies. This mathematical-based approach has the potential to lower the number of preventable hospitalizations by nearly 50% [2].

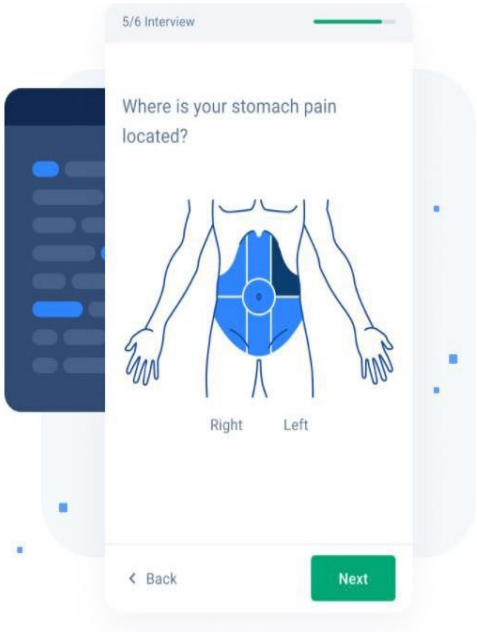


**Figure 1. Patient Triage Tool for Call Centers**
*Image credit: Infermedica*

The technology functions by listening to and analyzing conversations and background noise; comparing each call to thousands of past data points. By analyzing available information, the technology can suggest relevant questions for the dispatcher to ask to find an efficient recommendation for patient management. Importantly, the software serves only in an advisory capacity to the call taker. Since the software may not have data applicable to a novel situation, decisions must be made by the call taker.

AI products could help call takers identify the nature of the medical emergency, the type of assistance needed, and how to best streamline the emergency response. Integrating artificial intelligence into EMS call centers can assist first responders and call center operators in making informed decisions during a medical emergency. When combined with historical data points and existing protocols, an AI- facilitated EMS call center may alleviate the pressure on the first responder and medical communities by enabling machine learning models to suggest resource allocation and circulate important information.

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) program to inform emergency responder equipment selection and procurement decisions.

Located within the Science and Technology Directorate, the National Urban Security Technology Laboratory (NUSTL) manages the SAVER program and works with emergency responders to conduct objective operational assessments of commercially available equipment.

SAVER knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the responder community: "What equipment is available?" and "How does it perform?"

To explore the full library, visit SAVER online at www.dhs.gov/science-and-technology/saver-documents-library.

For additional information on the SAVER program, email NUSTL at NUSTL@hq.dhs.gov.

Science and Technology

## Capabilities and Features

AI has the potential to enhance the correct identification of the chief complaint, a mandatory component of every emergency call [3]. Current AI-facilitated options comprise multiple capabilities including seamless workflow integration, customizable content and user protocol changes, automatic keyword and critical symptom detection, dynamic question suggestion, and direct post-call feedback. Products capture call data using a "listening function" which assesses words, tone, pitch, and quality, and keeps a record of caller location, type of emergency, and response actions. This information is intended to support response teams with better resources to more effectively address the identified medical emergency in real-time.

## Future Uses

AI- facilitated call center software is an emerging technology providing supplemental information to reaffirm a live dispatcher's judgment and actions. In the future, AI may be employed to predict response times based on gathered data, locations, and environmental conditions. Also, determining the nature and severity of a medical emergency before a response may support a specific automated resource selection and treatment suggestions.

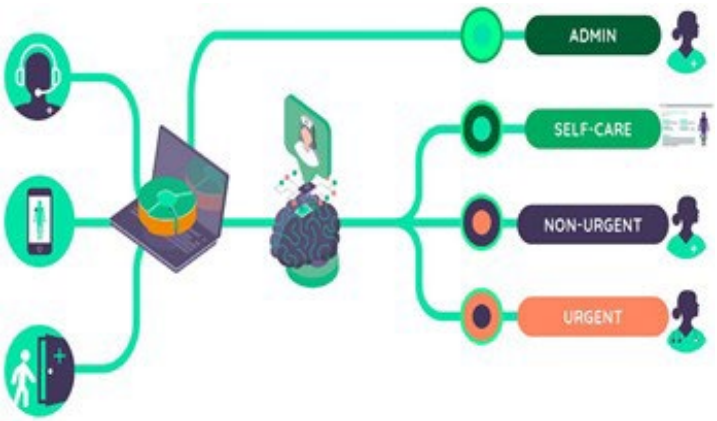


**Figure 2. AI Patient Triage Schematic**
*Image credit: Klinik Healthcare Solutions*

## Relevant Standards/Regulations

Guidelines for Public Service Answering Point (PSAP) call processing are offered by the National Emergency Number Association (NENA) in STD-020.1-2020. The Use of Artificial Intelligence in Health Care: Trustworthiness (ANSI/CTA-2090) defines core requirements for AI solutions used in health care and the impact on end users. Basic definitions and expected characteristics of AI in general are available in the Definitions and Characteristics of Artificial Intelligence (ANSI/CTA-2089). Thirty-seven additional International Standards Organization (ISO) documents cover AI applications, testing and performance assessment, functional safety, and quality evaluation guidelines (https://www.iso.org/standards-catalogue/browse-by-ics.html). These standards support considerations for implementing AI- facilitated call center solutions including but not limited to:

- Regulation of the underlying AI algorithms and data quality for analytics and machine learning
- Social, economic, and historical factors impacting local planning and applications
- Ensuring inclusiveness and equity through system taxonomies, controllability, and bias considerations in AI decision-making
- Risk management and protecting patient autonomy [4]

The above considerations will depend on technical specifications of the algorithm being used in the operational environment, and other constraints dictated by the emergency scenario.

## References

[1] Killeen, James P. et al. "A wireless first responder handheld device for rapid triage, patient assessment and documentation during mass casualty incidents." AMIA ... Annual Symposium proceedings. AMIA Symposium vol. 2006 (2006): 429-33.

[2] "Emergency Medical Services." Emergency Medical Services, https://www.corti.ai/use-cases/emergency-medical-services.

[3] Fraizer, A. "Be nimble, be quick,"3 June 2022. [Online]. https://www.iaedjournal.org/be-nimble-be-quick

[4] International Committee of the Red Cross. "Professional Standards for Protection Work,' 11 June 2020. [Online.] https://www.icrc.org/en/publication/0999-professional-standards-protection-work-carried-out-humanitarian-and-human-rights