Integrating the Healthcare Enterprise

IHE Patient Care Coordination (PCC) White Paper

Mobile Medicine (Fire & EMS) and Technology

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Foreword

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General information about IHE can be found at: www.ihe.net.

Information about the IHE Patient Care Coordination domain can be found at: ihe.net/IHE_Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at: http://ihe.net/IHE_Process and http://ihe.net/Profiles.

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1 Introduction

This document, the IHE PCC <White Paper name> White Paper, describes the challenges and solutions of connecting emergency medical services (EMS) to other healthcare systems in the United States. This will provide context for the healthcare systems to inform them of the steps that need to be taken to achieve interoperability.

1.1 Purpose of the <White Paper Name> White Paper

This whitepaper is intended to inform a variety of stakeholders of the political and technical challenges that are hindering emergency medical and mobile health systems in the United States from achieving interoperability. The current healthcare ecosystem does not easily allow for mobile medicine technology to interoperate. This document will describe the issues that hinder interoperability and recommend technology solutions that can help facilitate interoperability.

Scope

Health Information Exchanges (HIEs) and National Networks in the United States vary in consistency, maturity and funding. The funding incentives behind HIE development, efficiency, and electronic health record (EHR) upcharges from HIEs for connecting to EHRs is outside of the scope of this specification. Privacy concerns, auditing, and safe access to patient care are defined in the Privacy and Security Considerations section of this document. The abuse and biases that result from the access of patient information is out of scope of this document.

User interface and provider workflows are not an interoperability problem. They are a software design problem and out of scope for an interoperability specification.

Patient sourced electronic summaries are currently out of scope for this white white paper

1.2 Intended Audience

The intended audience of the IHE PCC <Name of> White Paper is:

- Emergency Medical Services software vendors
- EHR Vendors
- EMS stakeholders
- Health information exchanges
- Policy makers

1.3 Open and Closed Issues

1. NEMSIS standard sections and data elements do not completely align with the standard sections around patient information defined in HL7 and IHE.
2. Limited work has been defined around dispatch in the United States and its uses in these technical process flows. It may be added in after future discussions.

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2 The Problem

Mobile medicine and emergency medical services systems in the United States are struggling to interoperate with other healthcare systems in their communities. This lack of interoperability makes it difficult for these systems to be properly informed on the patients they are treating, which can lead to deadly consequences, for both EMS and hospitals.

2.1 Problem Description

Mobile medical services in the United States have been struggling with connecting to the healthcare ecosystems. Challenges include::

- Costs associated with standing up integration with a local Health Information Exchange.
- Inability to retrieve patient information (history, allergies, medications) when arriving at the patient's side.
- Inability to send patient clinical status to the hospital that will be receiving the patient.
- Hospitals collecting more than just a PDF form when the EMS electronic patient care report (ePCR) is completed (making it harder for hospitals to collect data for registry reporting)
- Inability to retrieve outcomes after a patient is discharged. The information may be needed for training, quality metrics, or process improvement.
- Dependencies on direct one-to-one connections to hospitals puts implementation burden on the EMS organizations and hospitals that need to go through the processing agreements and technical connections required to set it up.
    - A single ambulance service may need to connect to multiple healthcare organizations (Urgent Care, Ambulatory, Ancillary health care provider organizations, hospitals, etc.), within the jurisdiction(s) in which they operate
    - In large cities, many EMS agencies would each have to establish a connection with their local hospitals and electronic Patient Care record (ePCR) vendors
- Getting outcome data back from the receiving organization can be challenging. The difficulty getting outcome information back from receiving organization prevents the Paramedicine organizations from efficiently carrying out quality measurements and reporting necessary for improving patient health outcomes and quality of care provided.
    - Often the EMS organization is calling the hospital for the discharge summary
    - No policy exists for its requirement for facilities to send the discharge summary back to EMS
    - Often the information is sent via fax, leading to transcription from documents to ePCR forms

2.2 Context

The data models that govern the reports originate at the federal level, where they are not under the purview of the Office of the National Coordinator for Health Information Technology (ONC) and its Promoting Interoperability (PI) framework, or any other division of the United States Department of Health and Human Services (HHS). Rather, Mobile Medical data is structured by the National EMS Information System (NEMSIS), which is under the purview of the National

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Highway Traffic Safety Administration (NHTSA), which is part of the federal Department of Transportation (DOT). Meaningful Use was established by ONC, which is an office within HHS, while NEMSIS was established by NHTSA, within DOT. This is a fundamental part of what separates EMS from the rest of healthcare and a large contributor to the barriers. They are subject to different measures of success defined from these different branches. The federal funding distinction between HHS and DOT is critical to solving the interoperability issues.

- In the USA, EMS vendors are required to conform to NEMSIS, but there is no legal or policy requirement for EMS ePCRs to conform to EHR requirements.
- Without incentive programs in place for things like United States Core Data for Interoperability (USCDI) and specific EHR requirements from ONC, it can be a burden on the Mobile medicine vendors to implement NEMSIS, HL7 and IHE templates or profiles. Many mobile medicine organizations are unable to support HIE connections and maintenance without consistent funding.

There are major differences in how NEMSIS structures the captured data compared to IHE and HL7:

- NEMSIS data does not align perfectly with data structures and value sets defined by profiles in IHE and HL7. IHE is working to provide Valueset and section translations. There are current efforts in place for alignment of data elements and value sets; however, it will take 6-10 years until NEMSIS can align many of these elements. There are also many data elements within the NEMSIS standard that should be proposed to HL7 and IHE for alignment of the profiles to properly include Mobile medicine into their vocabulary and data structures.
    - Expansion of established value sets to include the EMS use case
    - Inclusion of alternative values in standard value sets to encompass EMS care

2.3 Challenges

2.3.1 Workflow Limitations

In an initial handoff, a mobile medical provider is only able to document a limited amount of the information that is needed to complete their record during a transport to the receiving facility. Many times, the providers are treating the patient first and documenting past medical history, interventions, and vitals after they hand off the patient. In many cases due to a short window of time, it is nearly impossible to complete the patient demographics and essential patient information documentation without compromising the care of the patient. With this understanding, there needs to be documentation supporting the transfer of the patient. Though patient information may be limited, it can still provide value for informed care.

Additionally, if a mobile medicine provider were to query a health information exchange for a patient's history, there needs to be a way to retrieve a summary document. One consistent worry the paramedicine community has is that if they ask for a patient record, too much information will come over and they will end up having to take additional critical time to search the records for the information they are really interested in, which could deter providers from using the solutions put in place.

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2.3.1 Interoperability without internet

Mobile medicine works outside of the standard health care settings. Providers are constantly moving around, never really able to stay in one place long enough to get a wifi connection set up. The reality of mobile medicine is that their ability to send or receive records is dependent on the quality of the network the vehicle can access. Some areas work well, while others lose connections. This is a limitation of their practice and needs to be anticipated when discussing interoperability solutions. While this specific problem is not one of the priority use cases, this white paper will need to discuss the techniques that can be used to mitigate the effects of network outages.

- Prefetch for expected patients [only usable for known patients and en route searches]
- ??

2.2 Data Models

Overall flow diagram http://build.fhir.org/ig/IHE/EMS-Overall/branches/master/pcf.html

Profile Links:

What can be added to it ?

- ADT messages for pre-registering patients and forwarding initial patient summaries
  - ADT 01
  - pt demographics
  - reason for visit
  - ADT A14 - pending admit
  - ADT A27 - Cancel Pending Admit
- Hospital response message containing assigned MRN and encounter IDs for future record matching
- Device feeds for ECGs and other continuous vital monitoring/forwarding

2.3 Use Cases

The following use cases are the key use cases that mobile medicine systems are looking to achieve with interoperability.

2.3.1 Use Case 1: Patient Information Access via Treatment Query

An emergency medical service arrives at a scene and needs access to the patient's history, allergies, and medications. With access to the patient's driver license and the ability to confirm their identity, emergency medical services can perform a patient match with their connection with a health information exchange. When the match is completed, they are able to request a medical summary document that can be brought into their ePCR record. They are able to determine their active problems and properly carry out informed care for the patient and bring them to the closest appropriate hospital. the ability to consume the summary document into their ePCR record cuts down on the time they need to input the information and focus on the patient's care during the transport.

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Diagram

2.3.2 Use Case 2: Hospital Connection

The emergency medical service crew is transporting their patient to the nearest appropriate hospital. Once the hospital has been chosen, EMS sends a notification to the hospital to indicate an arriving patient. This is an opportunity for the emergency services to send a pre-registration for the patient, along with any initial patient summary information they currently have, to the receiving facility. The facility accepts the patient and prepares for their arrival. Emergency medical services transfer their care to the facility staff. After the transfer is completed, the crew finishes their report, and a copy of that completed report is given to the facility for further reference and use for quality measure reporting.

Diagram

2.3.3 Use Case 3: Hospital Outcomes

After a mobile medicine crew completes a call or encounter, there is additional documentation that needs to take place in the back end. EMS providers are required by NEMSIS to report the outcomes of every call that they run. When the patient they transported is discharged, a copy of their discharge summary is sent back to the transport services company. They are able to take the information given in that summary to populate the outcome documentation. The mobile medicine company is able to run their own quality measures and submit information on the outcomes to any registries that are collecting information from them. This gives them to improve the quality of care to their patients and help inform public programs on the success of new health interventions in emergency medicine.

2.4.3 Use Case 4: Query for Missing Data

While documenting the data from the ePCR, the EMS organization noticed that some information was not available through the discharge summary they received and are

2.4.3 Use Case 5: Report a Measure

3 Standards Solutions

Existing profiles that can help facilitate interoperability are defined in this section.

profiles list and links.

Connecting to a Health Information Exchange

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IHE has an Enabling Document Sharing Health Information Exchange Using IHE Profiles white paper that defines the profiles that should be implemented to connect to an HIE. For EMS systems, an element mapping or translation service should be provided so that the information can be consumed by healthcare systems that are accessing this information.

Devices

IHE's Patient Devices domain has defined the relevant standards needed for device interoperability in their Service-oriented Device Point-of-care Interoperability (SDPi) white paper https://profiles.ihe.net/DEV/#1.3 .

3.1 TEFCA/QHINs National Networks Vs HIEs

Due to the nature of mobile medicine, we have determined that the best approach in the United States for accessing patient medical summaries, especially for emergencies, is to set up a connection with a qualified health information network (QHIN).

Potential policies that need to be in place to support EMS use cases

Developing a sub use case for EMS, specific to Operations query purpose of use, that can be agreed to by current Carequality implementers and QHINs, outlining the specific data elements EMS is requesting will ensure that Operations queries are responded to.

Data Elements may include: Hospital admission & discharge date/times, ED diagnosis/disposition & procedures, Hospital diagnosis/disposition &pProcedures, and Hospital discharge summary.

Cost benefits of this vs historical challenges for mobile medicine maintenance with HIE

Maintenance requirements that may need to take place

3.1.1 Functional requirements

1. If a Mobile medical system is receiving a patient's medical summary, the record SHALL have the severity documented with the allergies at the top and highlighted/indicated severe allergies in an easily identified color.
2. Any medical summary retrieved by an ePCR system shall be able to notate patient demographics, history, allergies, and medications in the beginning of the document.
3. A mobile medicine system SHALL have the option to import the medical summary elements into their ePCR in the relevant fields.
4. A hospital receiving a patient transported via mobile medicine SHALLsupport external identifiers within an encounter resource in FHIR to ensure patient matches for queries pertaining to patients with incomplete demographic information or unknown details.

4 Policy Challenges and Changes

There may need to be a policy for discharge summary feedback to EMS organizations.

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Whether automated or query-based, there needs to be a way to ensure that EMSorganizations can receive timely feedback of discharge summaries for the calls they perform as soon as they are available.

Considering that EMS has policies mandating reporting requirements for outcomes on every incident, policies at the national level need to support EMS in ensuring that the information can be obtained in the easiest and fastest way possible.

Coordination is needed with ONC on messaging to the health care community that EMS is part of the healthcare ecosystem and, as such, there remains a need to close the loop with the providers who first engaged and were the entry point into the healthcare system for the patient.

Predetermined language for query and response feeds for health exchange networks prior to onboarding

Policy and incentive programs may need to be set up for further EMS, HIE & EHR vendor development with standards (especially for community level, low cost ePCR users).

Implications of this for the EMS communities

4.1.1 Privacy Considerations

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Appendices

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Appendix A – <Appendix Title>

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