Direct Secure Messaging in Practice: Addressing Workflow Challenges

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Abstract. Direct Secure Messaging (DSM) is a sender-initiated communication technology for exchanging patient-specific information among clinicians and disparate healthcare organizations. As DSM adoption increases it becomes more difficult for clinicians and staff to manage the volume and variety of external data received. This can lead to information hazards that can produce cognitive overload and decrease the ability of clinicians to process patient data when reviewing multiple sources. While DSM is one of many options for electronically exchanging health information, we have found that poor user awareness of DSM features and variable EHR capabilities for sending, receiving, and managing messages and their contents demonstrate that additional work is needed to achieve DSM's potential as a low-barrier, ubiquitous option for clinical interoperability. This paper reviews these problems from end-user perspective and offers best-practices for both senders and recipients of DSM.

Keywords. Direct secure messaging, electronic health records and systems, health information interoperability, health information exchange, user acceptance and resistance, organizational change management, workflows and human interactions, socio-technical aspects of information technology

1. Introduction

The Direct Secure Messaging (DSM) specification was developed to advance interoperability by lowering the barrier for secure, electronic exchange of patient data between clinicians [1]. Direct addresses are authenticated, assigned, and maintained by EHR vendors or Health Information Service Providers (HISP). DirectTrust is the custodian of the DSM standard in the U.S. and provides real-time electronic access to a national directory of validated individual and organizational addresses [2,3]. DSM

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adoption and use have been on the rise; by the end of 2021 there were nearly 2.8 million Direct addresses in the USA [4]. As of 2022, clinical messages, documents, and notifications supporting transitions of care were the most common use for DSM [5].

In a recent editorial [6] we described the DSM standard, including its functions and benefits. Unsolicited health data exchange through DSM can be overwhelming. [7] Beasley identified five types of "information hazards" that can be caused or exacerbated by the growing volume and variability of external patient data handled by clinicians (see Table 1 for hypothetical examples when using DSM) [8]. DSM may add to these hazards by increasing data volume. This state-of-the-art paper will present workable solutions that clinicians and healthcare organizations can take to improve their DSM workflows.

Table 1. Potential Impacts of Poor DSM Implementation and Use.

Type of Impact[†]	Illustrations When Using Direct Secure Messaging (DSM)
Information Overload *"...there are too many data [...] for the clinician to organize, synthesize, draw conclusions from"*	• The volume of Direct and other messages clutters the clinician's inbox. • The message or attachment(s) exceed information needs of recipient. • DSM content is duplicated in other channels (e.g. fax) or as redundant messages. • Messages and content are not clearly or consistently tagged. • The format and presentation of DSM contents complicate finding needed data. • Senders must choose from multiple individual or organizational DSM addresses. • Senders are unaware that some DSM messages are automatically sent.
Information Underload *"...necessary information is lacking."*	• Senders cannot easily access up-to-date Direct addresses when sending DSM. • Expected DSM content is not received or is inaccessible to the clinician. • Some or all DSM content is received as unstructured data (PDF). • Needed data are not sent as CCDs. • Structured data in CCDs cannot be incorporated into the local EHR. • Information received by DSM is incomplete or out-of-date.
Information Scatter *"...information [is] located in multiple places."*	• Required information is scattered across multiple DSMs or other documents. • A single DSM contains both CCD(s) and PDF(s) with related information. • EHR lacks search features to find information in DSM and other sources. • Timing of message delivery makes correlating contents difficult.
Information Conflict *"...the clinician is unable to determine which data are correct."*	• Information received via DSM is outdated compared to other sources. • Different DSM sources code and format key demographics differently. • Structured data in a CCD does not correlate with narrative data.
Erroneous Information *"...the information is wrong..."*	• Information received via DSM is inaccurate. • Incoming DSM is erroneously matched to the patient record. • Structured data are incorrectly or incompletely incorporated into the local EHR.

† Adapted from Beasley JW, Wetterneck TB, Temte J, et al. Information chaos in primary care: implications for physician performance and patient safety. J Am Board Fam Med. 2011;24(6):745-751. doi:10.3122/jabfm.2011.06.100255

2. Methods

We used a modified Delphi process leveraging an expert panel of informaticians, health information technology implementers, and policy experts. After an initial collection of proposed best practices, we used online video discussions for multiple iterations of feedback and discussion, with each round building on the insights gained from the

previous round reducing the number of proposed best practices and refining them. This iterative process ensured that the final recommendations were well-informed and comprehensive.

3. Results

DSM best practices for clinicians and healthcare organizations

Consistent use of DSM to exchange patient information with outside organizations can replace faxes and complement other communication channels. However, clinicians and healthcare organizations vary widely in their use of DSM. Many have not yet developed or optimized their DSM workflows.

3.1. Ensure that all clinicians have an authenticated and published Direct address

EHR vendors, HIEs, and HISPs in the USA locate authenticated DSM addresses in the national directory maintained by DirectTrust. CMS provides an online list of clinicians' electronic endpoints like a Direct address in the National Plan & Provider Enumeration System (NPPES) [9]. We recommend that clinicians (or those who support them) should review DSM settings in the EHR and confirm they have a Direct address and that published entries in the DirectTrust and NPPES directories are accurate.

3.2. Consider etiquette when sending information via DSM

Much like email, many of the challenges recipients have in managing messages and documents received by DSM can be resolved by good sender etiquette. We suggest the following best practices when sending information via DSM:

- Learn and respect recipients' preferences for using DSM over other communication modalities. Some organizations have chosen not to implement DSM and may prefer other delivery methods.

- Ensure that your EHR's directory of DSM addresses is up-to-date and accurate. Notify your EHR vendor or HISP when errors, duplicates, or missing addresses are identified. Not all EHRs currently use the DirectTrust directory.

- Be careful in selecting recipient addresses. A clinician or organization might have addresses for multiple practice locations or departments.

- Label outgoing DSM messages with a consistent subject line. It will make it easier for the recipient to identify and prioritize messages. Note that some EHRs may not allow users to manually apply labels to messages.

- Only include relevant attachments. A CCD is, by definition, a comprehensive summary and may not always be the best choice to attach to a message. Look for options to select what is sent by choosing a single patient visit.

- To facilitate trouble-free record matching by the recipient, always use standardized formatting conventions when creating new entries of patient names and addresses in the EHR [10,11].

3.3. Use teamwork to manage inbox overload

Many EHRs provide configuration settings that allow users to delegate inbox access to staff or to automatically route messages to others. Because DSM supports many use cases, requiring clinicians to view and act on all external messages can contribute to information overload. By assigning a proxy for some or all messages received by DSM, delegates can triage and route important messages and documents.

3.4. Obtain organization or department level DSM addresses

Practice locations or departments can request an authenticated address from their EHR or HISP vendor that senders can use in place of individual clinician addresses (e.g., ObGyn.Referrals@VendorABC.Direct.com). Group addresses can consolidate types of messages such as general communications, incoming referral requests, and care summaries, thus reducing inbox burden for individual clinicians.

3.5. Embrace DSM in chart preparation and care coordination activities

CCDs received through DSM can facilitate chart preparation and inform patient care by reducing the need to search outside of the EHR for external information. Navigating a standard CCD will become less of a burden once users are familiarized with how information within is organized and displayed. To make finding information easier, some EHRs have enhanced CCD usability by including search features for keywords across multiple documents or other external sources.

3.6. Develop guidelines for incorporating data from DSM into the EHR

Most EHRs allow users to review and select some or all structured data of a CCD to be incorporated into the local medical record. Information imported from a CCD can support quality reporting, clinical decision support, vaccination forecasts, billing, and population health applications unlike unstructured data from a PDF attachment or fax.

4. Discussion

Although the use and usability of DSM is increasing rapidly, three main factors continue to present challenges to clinicians using this technology to exchange patient information. First, EHR vendors, HISPs, and HIEs have taken different approaches to implementing the DSM standard significantly affecting end users' general experience, workflow, and efficiency. Next, technical standards for DSM must continue to evolve to address gaps in the message specifications. These include: 1) Standardizing DSM message subjects and tags; 2) Using standard code sets (e.g., LOINC for lab results and SNOMED for observations); 3) Addressing variability and "bloat" in message content; and 4) Encouraging EHRs, HIEs, and HISPs to synchronize DSM addresses with a national

address directory (e.g., DirectTrust). As efforts to improve interoperability and data sharing gather momentum, DSM will be one of many options for electronically exchanging vital clinical information. While steps to make even more external information available to clinicians should be celebrated, vendors and organizations that provide DSM services must enhance their products to ease the burden of inbox overload, improve workflows, and prevent or mitigate information hazards.

5. Conclusions

Clinicians have been sending and receiving increasing amounts of health information between EHRs, HIEs, and HISPs, using the DSM standard. Inadequate design, implementation, configuration, and use of the technology can exacerbate cognitive demands on clinicians. Healthcare organizations and individual practitioners should examine and optimize existing their DSM workflows to resolve these challenges.

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