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Texting is caring: a content analysis of clinical text messages by hospitalists

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ABSTRACT

Background Clinical texting systems (CTS) are widely used in hospitals for team communication about patients. With more institutions adopting such systems, there is a need to understand how texting is being used in clinical practice.

Methods We conducted content analysis of 809 randomly selected message threads sent to and from hospitalists in a 9-month window. The process, purpose and content of messages were analysed. We also examined messages for personal content (to identify whether CTS was being used for professional matters) and discussion of near miss errors. The risk levels of these near misses were also assessed.

Results Most messages focused on clinical management of patient needs (62%; n=498) and functioned to provide a notification or update regarding clinical care (64%; n=518) or make a request of the recipient (63%; n=510). Personal content was infrequent in message threads (10%; n=80). Five per cent (n=38) of message threads included discussion of a near miss, and most near misses posed low clinical risk overall (66%; n=25).

Conclusion Most CTS communication centred around direct clinical management. Fewer messages were focused on non-clinical areas such as administrative tasks or personal communication. Further examination of care delivery, error communication and the consequences of the care discussed in messages would help clinical leaders understand the impact of clinical texting on teamwork and quality of care.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Little is known about how clinicians are using clinical texting systems (CTS) and what they are communicating over these platforms. Clinicians and clinical leaders have expressed concerns with message professionalism, content and frequency, which necessitates examination of CTS message content.

WHAT THIS STUDY ADDS

⇒ This study provides insight into hospitalists' communication topics and processes, highlighting that CTS are being used for the purposes of clinical care.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Implications of this research include the need for improved guidance and structure regarding the proper use of CTS, particularly in establishing effective communication, maintaining standards of care and identifying errors.

BACKGROUND

As health information technology has evolved, it has changed how healthcare teams communicate with each other. The use of alphanumeric pagers in hospitals, for example, has been in decline in recent years. In their place, healthcare systems are increasingly adopting secure clinical text messaging systems (CTS),[1–3] smartphone and desktop applications equipped with text messaging capabilities that meet privacy and security standards for healthcare.[4 5] Despite the prevalence of CTS in clinical care today, little is known about how clinicians use these systems to deliver care and what they are texting when they do.[6]

The adoption of CTS has led some clinicians to express concern about its appropriate use,[7–9] especially in the context of the high volume of alerts and messages received in a work day. A high volume of messages has been associated with physician burnout and dissatisfaction with time spent on clerical tasks.[10] Furthermore, evaluations of user experiences with CTS have found interprofessional tension in some settings, as some clinicians have expressed frustration about perceived misuse of CTS by others, or receiving messages deemed as 'unnecessary'.[7–9]

Few studies to date, however, have examined the content of the messages being sent. Doing so requires in-depth content analysis of messages. In this article, we conducted content analysis of clinical text messages to and from hospitalists at an academic medical centre. The objective of this work is to describe how clinical texting is being used by clinicians as a starting point for understanding the impact of CTS adoption on quality of care and patient safety.

METHODS

Setting

Our study was conducted with data drawn from a large, Midwestern academic medical centre. The medical centre implemented a secure CTS ('Diagnotes') for its clinicians on a rolling basis in 2018. The CTS, accessible

through a smartphone app and computer desktop software, replaced pagers as the predominant tool for in-hospital team communication. Study team members included a clinical informaticist and internist, a health services researcher with experience in electronic health communication, a research specialist working in clinical communication and a research assistant with experience in qualitative methodology.

Patient and public involvement

As this study focused on provider communication, patients and the public were not involved in the design, conduct, reporting or dissemination of this research.

Data collection

The CTS vendor, Diagnotes, provided the research team with all message threads sent between July 2020 and March 2021 to and from the medical centre's hospitalist staff (physicians and advanced practice providers). This sample included conversations where at least one sender or recipient was a hospitalist. Message threads are defined as one or more messages sent between users about a topic or episode of care, with an average of five messages per thread in our sample. We reviewed a random selection of message threads using a random number generator. As the nature of this project was exploratory, we continued adding message threads to the sample until thematic variation and content saturation was reached rather than predetermining a targeted sample size of messages for analysis.[11 12] We additionally gathered demographic data on the hospitalist staff from the medical centre regarding age, race, sex, clinical role and number of years in clinical practice.

Content analysis

The research team identified three main message characteristics in analysing each thread: the process, purpose and content of messages. For each characteristic, categories of interest emerged from our iterative, staged approach to content analysis. Three members of the study team (CED, JLL and PLF) conducted initial analyses together, coding 150 threads to establish a uniform coding scheme. Disagreements between reviewers were resolved by consensus on a case-by-case basis. After this initial coding scheme was finalised, subsequent message threads were divided evenly among the three reviewers and independently analysed. During the period of independent review, the team also met to double-code an additional 50 message threads to continue establishing consensus. In total, 200 message threads were coded by more than one reviewer, which represented 25% of the sample. Reviewers were blinded to the identity of the users.

In analysing the clinical process discussed in each message thread, we identified four main categories: discharge, administrative, clinical management and those we could not identify ('don't know'). For message purpose, we identified six categories, including assignment, clarification, notification or update, request, planning and other. The research team also noted different types of content, or topics that were frequently discussed in the messages. We coded content by counting the frequency of occurrence of a topic of interest (eg, a message mentioning a neurologist was coded as referencing a specialist or consultation),[13] regardless of whether the content was an active discussion point within threads or a passive referential point.

Near-miss analysis

In conducting our analysis, the research team noticed that some threads contained discussion of mistakes that had occurred. We coded these occurrences as 'near misses'—defined by the Agency for Healthcare and Research Quality as, 'errors that occur in the process of providing medical care that are detected and corrected before a patient is harmed'.[14] These messages were flagged and then later reviewed by a physician (MW) and two other reviewers (CED and JLL) to confirm the near misses and assess the severity of the potential magnitude of harm of each near miss. Near misses were coded according to type (errors of omission, commission, delay in care and general communication errors) and potential magnitude of harm (low, medium and high). As with the initial analysis, the reviewers coded in an iterative process, guided by existing frameworks for categorising errors and categories that emerged from the data. We defined harm as any medical or financial consequence to patients and assessed two types of potential for harm: 'detected', referring to the potential severity of patient harm after the error was detected (ie, the current situation) and 'undetected', referring to the estimated magnitude of harm should the near miss have gone undetected, and harm occurred. Since no validated measures for rating near miss potential for harm were identified, we established our own system for rating severity based in current literature and guidelines on near miss reporting. In determining these categories and levels of risk, we adapted concepts from previous studies of medical errors or harm, such as likelihood of physical injury, major injury, duration of injury and death.[15–17] Our assessment was meant to provide a broad understanding of magnitude of error rather than precise estimates of risk.

RESULTS

A total of 129 360 threads were sent during the study period. Of these, we analysed 809 (0.6%) threads. We determined saturation had been reached based on consensus from team members that additional message threads no longer yielded new insights or themes.[11 12] The average thread length was five messages. Our analytical sample included a total of 614 unique users, 66 of whom were hospitalists. On average, the hospitalists were in the age group of 35–44 years old and had spent 13 years in clinical practice. Table 1 describes their demographic characteristics. The hospitalists' demographic data were drawn from two internal departmental sources and

Table 1 Hospitalist demographics

Demographics	Per cent
Sex	
Male	61
Female	39
Race/ethnicity	
White	53
Asian	37
Black/African American	6
Hispanic/Latinx	3
Two or more races	1
Age (years)	
25–34	32
35–44	46
45–54	10
55–64	12
Role	
Attending physician	50
Nurse practitioner	31
Physician assistant	19

presented in aggregate as percentages without individual Ns, as the number of hospitalists included in each source was slightly different. As we were blinded to the identities and demographics of message senders, table 1 serves to provide context on the clinicians in our sample rather than to provide within-group comparison.

Table 2 summarises the message threads by process and purpose with illustrative examples. Among the 809 threads in which the hospitalists participated, clinical management was the most common process discussed in the threads (62%; n=498). The next most common category was 'don't know' (25%; n=206). Many of these 'don't know' threads were single-message threads with little detail and no follow-up response; they were often simple requests for the recipient to call back. In these situations, the message process was often indiscernible. About 14% (n=115) of threads discussed administrative matters, and 12% (n=97) pertained to patient discharges.

Regarding purpose, the two most common purposes for the threads were to provide a notification or update (64%; n=518), and to make a request of the recipient (63%; n=510). Common scenarios for these categories were conversations where information about patient symptoms or orders for patients were relayed between team members.

The content of each message thread was additionally identified. Questions and orders were the most common features of the threads in terms of content, comprising 50% (n=406) and 46% (n=374), respectively. Symptoms (34%; n=275) and medications (32%; n=255) were also frequently mentioned, followed by procedures (25%; n=206) and conversations about admission, discharge or transfer (ADT) (24%; n=194). The least common topics discussed were specialist consultations (15%; n=119), personal issues (10%; n=80) and near misses (5%; n=38).

Near-miss analysis

Thirty-eight message threads in our sample were identified to include discussion of near misses, which represents 5% of the sample. Table 3 provides a detailed description, example and prevalence of each type of near miss. All but two of the near misses (95%; n=36) were recognised and corrected within the message thread. We could not determine if these two near misses were resolved from the available information because there was no response (ie, confirmation) from the recipient. The most common topics discussed in the near miss threads included medications (32%; n=12), orders or tests (29%; n=11) and conversations related to ADTs (21%; n=8). Of the four types of errors, errors of commission were the most common (61%; n=23), followed by errors of omission (55%; n=21). The error types were not mutually exclusive. For example, an error could be both an omission and a delay, as instances of omitting clinical information can lead to a delay in care (eg, 'I had transfer orders since yesterday stating no tele (see orders in Cerner) Not sure why she stayed in pcu overnight').

Potential for harm

It is important to note that our identification of near misses was limited to issues that were likely corrected, as that is often why messages about errors were sent. Accordingly, we also assumed that harm likely did not occur. However, our identification of near misses in the sample included estimates of potential for harm. Most near misses presented low likelihood for patient harm or excess cost (66%; n=25). Low likelihood of risk included situations like noting a wrong tidal volume or placing incorrect diet orders. Twenty-four per cent (n=9) were rated as 'moderate' likelihood for harm, including instances of administering unwarranted restraints or discharging a patient at the wrong time, both of which could lead to injuries, medical errors or excessive cost. No message was determined to present a high likelihood of risk occurring to a patient, and 4 (11%) were undeterminable for likelihood of risk, due to no documented text response or follow-up from the recipient.

Consequences of potential harm

Seventy-four per cent (n=28) of the near misses in our sample presented a low severity of patient harm if harm was to occur. One example of this was a patient being moved to the wrong unit: even if the error had not been caught before it occurred, and harm did occur, the severity of harm caused by the delay was likely to be low. Thirteen per cent (n=5) presented a likelihood of moderate harm. This included situations involving a patient receiving unwarranted restraints, as this could lead to injury. One near miss was rated as having high potential severity of harm, as it involved a situation where

Table 2 Types, definitions and examples of message thread characteristics

Message characteristic	Type	Definition	Example	No (n=809)	Per cent
Process	Discharge	Discussion of patients being discharged and preparations for patients to leave the hospital	'Do you have an anticipated discharge date for [patient)?'	97	12
	Administrative	Discussion of administrative tasks such as staffing, coordinating insurance or other non-clinical-related healthcare info	'Dr [Name] could you put something in writing for [provider] to fax to help the case.'	115	14
	Clinical Management	Discussion of clinical issues directly related to patient care, such as procedures that need to be done, patient symptoms, test results or other clinical process	'He has stone in bile duct and cholangitis so we need to do ercp today' 'pt on [team], he came in UTI, sepsis, his temp was 39.1, I gave him tylenol earlier, now his temp is 37.4.'	498	62
	Unknown	Process could not be ascertained from context	555–5555, Dr. Smith, team i, John Doe	206	25
Purpose	Assignment	Presenting information regarding assignment of patients to a unit, or assignment of staff to specific tasks	'Good morning—are you still covering [patient]?'; 'Team [xx] pls c ER admit. Accepted already by Dr [provider] thanks'	83	10
	Clarification	Correcting or clarifying information that was previously presented	'for a neph tube placement, is there another reason for the scan? If not a KUB xray would be sufficient for this' 'Nope, a KUB would be fine. Thanks!'	126	16
	Notification/update	Presenting new information, usually about a patient's status	'Pt had a bs of 442. Put into stabilizer and it says too soon to treat since last bs was put in 3 hours ago. Just wanted you to know about sugar level still being high. Thanks, I'm at [xxxxx]'.	518	64
	Request	Asking for specific task to be done, such as ordering laboratory tests, writing a prescription, or requesting a recipient to check on a patient	'I am monitoring him for refeeding and has not gotten any labs this am, nor or they ordered. Could we get a bmp with phos and mag Q12'	510	63
	Planning	Discussing future-oriented care decisions, such as follow-up care after discharge or next-day plans for rounding on patients	'We were thinking 4wks treatment with reimaging and follow up at that point but let me double check'	115	14

a patient could have been prescribed a drug to which they were allergic. Eleven per cent (n=4) had indeterminate severity of harm, due to a lack of a response from the message recipient(s).

DISCUSSION

In this study, we analysed the content of 809 secure clinical text threads sent to and from hospitalists within a 9-month period, to understand how care delivery occurs and is communicated through CTS. Most messages involved communication about clinical management (62%; n=498) while a notable minority focused on administrative content (14%; n=115) and patient discharge (12%; n=97). This finding that CTS is used mainly for clinical management was also evidenced by the topics discussed. The most frequent topics included patient symptoms (34%; n=275), medications (32%; n=255) and clinical procedures (25%; n=206). Users are most commonly using CTS to carry out day to day conversations about clinical care and patient needs, indicating CTS have become an integral part of patient care and communication.

While clinicians often disagree on what appropriate CTS communication looks like, many agree on the benefits of CTS for accomplishing clinical tasks.[8] This is reflected in our results, as the majority of messages in our sample focused on clinical care. Only 15% of messages focused on what we deemed 'administrative' process,

Table 3 Types, definitions, examples and prevalence of near misses

Error type	Definition	Example	Per cent (no)
Omission	Error in which something was not done that should have been done	'We received PT orders for [patient]. Patient noted to be in special respiratory isolation with respiratory symptoms. Noted mention of COVID testing but no test ordered. Is there a concern for COVID with this patient?	55 (21)
Commission	Error in which something was done that should not have been done	'On pt [name] who was dc'd yesterday—your norco script was for 10/300. Needs to be 10/325. Can you resend to her pharmacy or call them?"	61 (23)
Delay	Error that caused a delay in patient care	'I had transfer orders since yesterday stating no tele (see orders in cerner). Not sure why she stayed in pcu overnight.'	37 (14)
Communication	Error related to miscommunication, missed messages or misunderstandings	'Is your team primary on pt now or is ortho? Pt does not have an admission status order on his chart and I've noticed that trauma signed off. Not sure who to contact now for an order before she's discharged. Thanks.'	21 (8)

meaning messages related to staffing, coordinating insurance or other non-clinical-related healthcare information. Although these tasks are often expected of clinicians, some clinicians may feel that the total volume of messages (fielding clinical and administrative messages) may distract from more pressing clinical tasks or cause some clinicians to receive messages while off the clock.[8 18] Frustration with receiving messages while not on call is echoed in overall physician burden while out of office, as Apathy *et al* noted that 50% of physicians reported frequent electronic health record use on workday evenings.[19] Whether users view additional administrative communication as an appropriate use of CTS may depend on their role, specialty and setting. The optimal balance of processes on which CTS should focus has yet to be determined and may depend on many different factors. Better understanding of the link between users and content may help health systems and professional societies develop CTS guidelines and maintain user satisfaction.

Interestingly, while the purpose behind most of the communication we reviewed was clinical management, there was a notable minority of messages in which almost no clinical information was conveyed. We were not able to ascertain the process in 25% (n=206) of message threads, often because they were single messages that only included a clinician name, patient name, phone number and little other context (eg, '(555)555-5555, Dr. Smith, team X, John Doe'). In those circumstances, CTS was used much in the way pagers once were, to notify the recipient of a requested phone conversation without providing additional details. While it is impossible to determine the reasoning for sending these types of messages, it is important to consider circumstances where clinicians may choose to use CTS in this manner. This could include senders who want to have a long or sensitive conversation that they do not want to put in writing. The different ways that hospitalists can use CTS to communicate demonstrate the expanded functionality of CTS over traditional pagers, but also the persistence and continued need of this pager style of communication.

Professionalism in clinical texting is an area of concern that has been raised by clinicians and health system leaders,[20] including concerns about smartphones being used for unprofessional or personal forms of communication in the workplace.[21] In our study, we found only a small number of threads to contain any personal content (10%; n=80). Of those messages, almost all were professional in nature and work related. Examples of these included clinicians using an emoji to soften work related requests or responses or wishing 'happy birthday' to another team member. Despite finding some personal content, most message topics were related to clinical care, suggesting that personal communication over CTS does not seem to interfere with clinical tasks.

We found that 5% (n=38) of all communications in our sample contained discussion of a clinical mistake that was caught (a near miss). The actual number of near misses that go unreported in healthcare settings is difficult to determine, but it is suggested that near misses happen 300 times more frequently than noticeable adverse events.[22] Given how often errors go underreported, examination of CTS messages may help us learn more about medical error discussion and resolution between clinical team members. Pinpointing certain topics or areas where communication errors are more likely to occur could provide insight into ways to prevent those errors. For example, recurring near miss topics in our sample included diet orders and medication dosing. In further exploration of CTS communication, examining near misses or other communication errors could be additional areas to target for quality improvement and patient safety efforts.

Implications

Our research findings have several implications for clinicians and healthcare policymakers. We found that hospitalists are using CTS to manage clinical care, yet other literature on this topic shows they are often texting with little guidance from healthcare systems and policymakers on how to effectively use CTS, which can lead

to clinician burden and frustration.[8 23] The possibility of implementing specific training or guidance during CTS rollout should be addressed and considered. It is additionally important to continue examining the relationship between training and clinical texting, as effective communication can result in increased quality of care, fewer errors, decreased lengths of stay and lower mortality rates.[24–27] For researchers, our analysis of CTS content presents a new field of exploration and source of data on team relationships and care delivery by inpatient teams. The identification of near miss errors in our sample additionally shows the need for further research into patterns of CTS error occurrence and reporting. Understanding how clinicians are using CTS and identifying their specific communication needs could provide insight into best practices, problem-solving and how to continue delivering quality care to patients.

Limitations

One of the key limitations of this study is its limited scope. Our data was limited to communications that were either sent by or sent to hospitalists at one academic medical centre. Although the hospitalists in our sample reflected a range of age groups and roles and communicated with many different team members across the health system, including social workers, surgeons, hospital administrators and many others, our understanding of how CTS is used in other settings is limited. Different medical specialties, types of providers, or health systems may have their own norms and practices. Yet while our analysis may have lacked breadth in communication within other specialty teams or institutions, we focused on depth to provide a nuanced understanding of the different circumstances and topics about which these hospitalists communicated using CTS.

CONCLUSION

As hospitals continue to introduce CTS as a means for clinical communication, clinical texting is being used to facilitate communication about clinical management tasks. The CTS was most often used to discuss clinical care, specifically to notify or update other team members about patient statuses or request information related to patient care. There was little to no evidence of unprofessional clinical texting. While the near misses in our sample were caught and addressed by clinicians, further analysis of clinical errors made over CTS could highlight ways to improve communication efficacy and prevent future errors. As CTS continue to contribute to upholding the quality of patient care, understanding baseline use, communication needs and training needs are critical for understanding how these new tools may affect and ultimately improve clinical teamwork and care quality.

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Competing interests None declared.

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Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by Indiana University Institutional Review Board; #1901935879. Our study only used retrospective data pulled from the diagnotes clinical texting platform. Participants were not identifiable in this dataset and the volume of unique message senders in the dataset would make informed consent impractical.

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