Smartphones let surgeons know WhatsApp: an analysis of communication in emergency surgical teams


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Abstract

BACKGROUND: Outdated communication technologies in healthcare can place patient safety at risk. This study aimed to evaluate implementation of the WhatsApp messaging service within emergency surgical teams.

METHODS: A prospective mixed-methods study was conducted in a London hospital. All emergency surgery team members (n = 40) used WhatsApp for communication for 19 weeks. The initiator and receiver of communication were compared for response times and communication types. Safety events were reported using direct quotations.

RESULTS: More than 1,100 hours of communication pertaining to 636 patients were recorded, generating 1,495 communication events. The attending initiated the most instruction-giving communication, whereas interns asked the most clinical questions (P < .001). The resident was the speediest responder to communication compared to the intern and attending (P < .001). The participants felt that WhatsApp helped flatten the hierarchy within the team.

CONCLUSIONS: WhatsApp represents a safe, efficient communication technology. This study lays the foundations for quality improvement innovations delivered over smartphones.

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Patient care has been revolutionized by the information age; the last 2 decades have seen diagnostics and treatments transformed by widespread technological progress. However, the method by which physicians communicate with each other remains reminiscent of a period before smartphones and social media. Apart from certain hipster parts of New York and London, pager systems are no longer seen as an effective communication tool given the obvious advantages of cell phones. Many hospitals still use outdated pager systems as the foundation for clinical communication between physicians, nurses, and other health care professionals. This is despite problems including long waiting-times for the return of a page, high costs, frequent interruptions, and the inability to identify the location or identity of the caller. From a patient safety perspective, this is of significant concern given the fact that poor communication often lies at the heart of an adverse event. Although previous studies have evaluated communication in acute settings, the focus has been on direct or face-to-face communication. The Situation, Background, Assessment and Recommendation (SBAR) communication tool has been produced, and some interventions evaluating its use have been trialed but it has not been widely adopted. It remains difficult to measure the effect of SBAR implementation as it is a verbal communication tool.

No study available to date has evaluated the use of mobile electronic communication in surgical teams—despite the fact that many physicians are now jettisoning their hospital pagers and using their personal cell phones to facilitate professional communication. Approximately 80% of US physicians have smartphone access at work. Smartphones are built on mobile operating systems and have more advanced connectivity and computing power compared with traditional mobile phones. WhatsApp (WhatsApp Inc., Mountain View, CA) is an increasingly popular mobile messaging application (app) available on all smartphone platforms. With its widespread uptake, we believe that WhatsApp represents a disruptive innovation in health care communication offering numerous benefits to clinicians and especially emergency surgeons. The unpredictable nature of working as an emergency surgeon who must be available at all times to manage unstable patients alongside performing surgeries and running clinics places a premium on safe and efficient communication. If the team is to function well and avoid clinical incidents, they must be able to communicate swiftly and clearly at all times.

This study aims to evaluate, for the first time, the use of WhatsApp for facilitating communication in an emergency surgery setting and discuss its wider application to healthcare.

Objectives

1. Identify the common initiators and receivers of communication within a team.
2. Establish the types and clinical domains of communication used through WhatsApp.
3. Evaluate the response times to communication for different communication types, domains, and clinician grades.
4. Explore participant’s perception of WhatsApp for team communication.

Methods

Recruitment

An acute general surgery team responsible for all emergency admissions in a London (United Kingdom) teaching hospital participated in this study. The nature of the team’s emergency workload involves rapid assessment, management, and discharge of all acute surgical patients. All team members were included so no sampling was required. An attending, a resident, and 2 interns rotating on a weekly basis made up the team, meaning 40 team members participated in the study. Medical students and junior residents also joined the team at occasional times for education or training.

Details of app

WhatsApp is an app, used by more than 500 million people worldwide that allows smartphone users to send text messages and other types of media (such as videos, voice messages, and photographs) to their contacts. It also facilitates the creation of groups; this allows multiple users to participate in and monitor the conversation. WhatsApp avoids charging for each message by using cellular data plans and wireless Internet networks; an annual subscription is currently $0.99. For the purposes of this study, participants used the secure wireless network rather than their mobile data plan when using WhatsApp to ensure security.

Project approval

This project was confirmed as a service evaluation; formal ethical approval was not required. Participants used their own smartphones over the hospital’s secure wireless network and gave informed consent before participation. Approval was secured from the hospital’s information governance department on the basis of 3 conditions being met:

1. No storage of WhatsApp data on participant devices beyond the end of the working week was allowed. The team attending downloaded and kept a hard copy in a secure location for record keeping purposes.
2. Patient-identifiable data were omitted from team communication on WhatsApp; the patient’s initials and a brief clinical description allowed team members to identify the subject of communication without breaking confidentiality.
3. Professional behavior had to be exercised in all communication on WhatsApp. To facilitate this, all
participants were offered a weekly induction briefing from the attending detailing the aforementioned conditions along with practice guidelines. These guidelines reminded participants of the importance of contemporaneous documentation of clinical decisions communicated via WhatsApp in the clinical notes.

Innovation

WhatsApp was used as the official platform for communication after a 2-week pilot period. All communication between team members was captured over a consecutive 19-week period (October 2012 to March 2013). Clinicians continued to be notified of cardiorespiratory arrest and peri-arrest scenarios via the pager device; all other matters were communicated on WhatsApp. Communication was stored on the WhatsApp platform itself between 8 AM and 8 PM Monday to Friday. From the stored information, scripts were produced to represent 1 week of communication each.

Analysis and statistics

After removal of patient-identifiable details by the team’s attending, data were extracted from the scripts regarding the identity of the initiator and receiver of each communication event, the response time, communication type, and clinical domain of each episode. These communications were then analyzed to uncover the inner workings of the team. Communication events were analyzed using SPSS (version 20; IBM); statistical significance was taken when $P$ was less than .05. Data regarding communication frequency were analyzed using the chi-square test; data regarding response times were analyzed using Kruskal-Wallis and Mann-Whitney tests. These analyses evaluate whether certain communication types and clinical domains occurred more commonly than others. In addition, standardized qualitative methodology was used to identify emergent themes regarding the nature of these communication events. Two coders used a coding framework to categorize these communications, noting in particular where potential patient safety events had occurred. Such episodes are reported with supporting quotes. Participant’s reflections of using WhatsApp were captured using semistructured interviews lasting approximately 10 minutes, conducted at the study center, which were analyzed using standard qualitative techniques.

Results

A total of 1,140 hours of clinical communication pertaining to 636 patients over 95 days was recorded. This yielded 1,495 communication events (a median of 65.5 communication events per week). Of these, 359 came from the attending, 318 from the resident, 784 from the interns, and 34 from other team members. The pattern of communication from each participant over the course of the study is displayed in Fig. 1. Communication events were grouped into episodes ($n = 658$) and coded according to their type (administrative question, clinical question, information-giving, or instruction-giving) and the clinical domain to which they pertained (administration, discharge, education, investigations, prescribing, theater, or ward care).

![Figure 1](https://via.placeholder.com/150)  
Figure 1  A line chart showing the frequency of communications per week by each grade and the total number.
Initiators and recipients of communication

Interns initiated the most communication episodes (413; 64.9%) followed by the attending (151; 23.7%) and resident (72; 11.3%). Other team members initiated the remaining episodes. For episodes where the intended receiver was not specified or multiple receivers were specified, the receiver was classified as “team”; hence, the greater number of received episodes than initiated. The team received the most communication episodes (269; 38.7%) followed by the attending (196; 28.2%), the resident (132; 19.0%), and the interns (98; 14%; Fig. 2).

Types of communication events

In terms of frequency, clinical questions formed the most common type of communication event (417; 39.3%) followed by information-giving comments (378; 35.6%), instruction-giving comments (207; 19.5%), and administrative questions (60; 5%). Clinical questions (n = 417; chi-square = 248; P < .001), administrative questions (n = 60; chi-square = 7.75; P = .02), and information-giving comments (n = 378; chi-square = 192; P < .001) were most likely to be initiated by interns. The “team” received more information-giving comments than any other communication type (n = 269; chi-square = 93; P < .001). An example of an instruction-giving comment can be seen in Fig. 3. Often, several different types of communication were combined in a single communication episode (Fig. 4).
Clinical domain of communication events

Most communication episodes concerned ward care and investigations. Requests for clinical assistance or advice were often the focus of ward care communication: “Patient EH in High Dependency - I’m worried she’s got pulmonary edema. I’ve stopped fluids, started Oxygen, ordered a chest x-ray and giving 20mg IV Furosemide [Lasix]” (intern). “Good. Please get urgent Medical review” (attending).

Although prescribing questions were not very common, some were vital for patient safety: “Shall I restart Aspirin and Clopidogrel [Plavix] for sub-arachnoid hemorrhage patient who is going home?” (intern). “No, don’t restart. Please check with Cardiology” (attending).

Response times

The attending responded to 193 communication episodes in a median time of 7 minutes, the resident to 174 communication episodes (median 2 minutes), and interns to 177 communication episodes (median 3 minutes). The difference in these response times among the professional grades was statistically significant \( H(2) = 41.3; \ P < .001 \), with subgroup analyses revealing significant differences between the attending vs resident \( (P < .001) \), attending vs intern \( (P < .001) \), and resident vs intern \( (P = .007) \).

There was also a significant difference between response times according to the type of communication \( H(3) = 13.05; \ P = .005 \). In particular, this response time differed with regard to administrative questions (median 1 minute) vs clinical questions (5 minutes; \( P = .006 \)), instruction-giving comments (2.5 minutes) vs clinical questions (5 minutes; \( P = .003 \)), and information-giving comments (3 minutes) vs instruction-giving comments (2.5 minutes; \( P = .019 \)).

There was a significant interaction between grade and response time for clinical questions in that the attending responded slower than residents and interns \( H(2) = 28.9; \ P = .001 \). Testing the response times according to the clinical domain of communication episodes revealed no significant differences between the various types \( H(6) = 3.5; \ P = .739 \).

Qualitative analysis of reflective comments

Participants were asked to reflect on the use of WhatsApp. Interns felt that the ability to send a quick message rather than make a phone call was helpful: “I like being able to send a message about basic questions that require a simple answer, it is reassuring”. The attending was grateful for the increased level of supervision WhatsApp gave him: “The fact that I can constantly monitor what my team is doing for my patients allows me to step in when needed but leave them to it at other times.” The resident felt that WhatsApp helped to remove communication barriers between junior and senior colleagues “I feel that this system has encouraged the juniors to keep us updated, even about things they think are minor. They may not take the trouble to page us with informative updates to avoid disturbing us in theater but are very happy to send a WhatsApp message.” The team has decided to continue using WhatsApp in the future.

Comment

Principal results

This study explored the use of WhatsApp by an emergency general surgery team in London using both quantitative and qualitative methodology. This is the first study of its kind that investigates how such a communication system operates within a clinical team and quantifies both the direction and type of communication between doctors. Most communication initiated by interns was information giving or a clinical question, whereas more senior team members provided instruction-giving comments. Clinical questions were responded to more slowly than other types of communication and this may be
because of their relative complexity compared with other communication types. A simple administrative question or instructive comment may only require a short, quick response, but a clinical question often requires a doctor to review a patient or at least check a test result; therefore, the reply takes longer. In general, the attending took longer than the other team members to reply to communication, which may be a reflection of higher workload. This is important from the patient perspective as the attending is responsible for the team and must be contacted when definitive decisions about patient care need to be made.11

Comparison with prior work

There is a paucity of literature that examines health care worker’s response times to communication; this is an important subject and deserves greater focus. Research on medical emergency teams has revealed that ineffective communication methods can lead to treatment delays and failed escalation of care.12,13 Worse still, studies have highlighted that patients are subject to significant harm because of poor communication.14,15 Human factors such as hierarchical barriers and inadequate information transfer techniques contribute to these failures.16 In this study, the threat to patient safety presented by these factors was successfully overcome through the use of WhatsApp.

The fact that almost all health professionals in the United States of America and the United Kingdom now carry cell phones (and increasingly smartphone devices) has disrupted the way many clinical teams are communicating. WhatsApp represents a successful technological innovation that effectively replaced the pager over a short time period and continues to be used well after the period this trial ended. The findings of this study are in agreement with research showing that handheld computers improve efficiency, clinical decision making, and documentation practice.17 These positive aspects may have an effect on the quality and safety of health care delivery. Future research could seek to determine how well communication tools such as SBAR and innovations such as WhatsApp work together. Successful interventions in this area should aim to include strategies for improvements in both the content (eg, SBAR) and mode (WhatsApp) of communication.

Change efforts in healthcare are often ambitious and use a whole-system goal18; the use of a more modest initial target in this study may have contributed to its success. Computer-based innovations supporting decision making have been successful in improving the safety of medication prescribing. The barriers overcome by these systems, of which WhatsApp is an example, may be a platform for further successful innovation in the health care communication sector.19 Further development of health care communication technology will need to include the integration of direct access to patient information.20

This study involved an entire population rather than a sample, eliminating the potential for participant bias. Consecutive weeks of data collection mean that selection bias was also not an issue. There was no observer bias or measurement bias on the ability to record; date and time stamp clinical communications removed any interpretation error. Detailed qualitative analysis of team perceptions allowed in-depth exploration of the participant’s receptiveness to WhatsApp. The statistical analysis presented in this study allows the crucial role of hierarchy within the team to be explored in detail, something that has not previously been researched in surgical teams outside of the operating room. The greatest potential benefit from using systems such as WhatsApp is the increased involvement and supervision from the attending surgeon. However, as this work is taken forward, care must be taken to ensure that the autonomy of other decision makers in the team (such as the resident) is preserved to avoid prolonging their learning experience.

The use of a single center and exploration of communication in emergency surgery only may limit the application of the findings to other hospitals and specialties. There was an absence of out-of-hours communication in this study, and further work is required to evaluate the use of WhatsApp and other communication tools between different health care staff (eg, nurses). There was no comparison of any communication outside the WhatsApp platform or an assessment of the quality of communication; these areas were outside the scope of this study. Furthermore, the communication pathways may be different in private health care institutions, limiting the generalizability of the findings to academic centers. Consideration of wireless network coverage and hospital dead zones (areas without wireless service) will be needed as this system is expanded into other clinical areas and institutions.

Conclusions

The findings of this study provide a novel and detailed examination of the communication between members of a clinical team. It meets the current need for evaluation of communication methods in healthcare.21 The WhatsApp platform was deemed to be user friendly and was extensively used to facilitate communication within a team where junior physicians rotate on a weekly basis. In addition, significant benefits were realized through a system in which senior physicians had a constant overview of activities undertaken within their team without active interference, allowing their juniors to develop a degree of clinical independence at minimal risk to patient safety. WhatsApp also provides an added benefit of providing a record of communication for audit and training purposes. Although there is some concern around the use of mobile messaging services in transferring sensitive data,22 strict information governance policies and a cautious approach to confidentiality and safety will enable the beneficial aspects of such communication platforms to be made widely available.23
WhatsApp was universally accepted as a simple and efficient frugal innovation for communicating within a surgical team. It helped flatten the traditional hierarchy between team members, thereby overcoming the human factor barriers to effective communication. Increased connectedness between team members allowed junior trainees to have easy access to a more experienced clinician, which provided them with greater support and supervision. This study illustrates the potential for simple technological innovation to improve patient safety. In doing so, it lays the groundwork for both technology development and subsequent testing in the clinical environment.

References