

Augmenting clinical communications between doctors and patient families through short text message updates – A Singapore healthcare experience

Zhiquan Damian Lee^{a,*}, Huiling Linda Lim^{a, b}, Cadence Wei Lin Wee^b,
John Tsia-Chuen Kan^{c, d}, Chongyan Wang^d, Kai Wen Aaron Tang^{e, f}

^a Department of Neurosurgery, Changi General Hospital, Singapore, 2 Simei St 3, 529889, Singapore

^b Department of Anaesthesia, Tan Tock Seng Hospital, Singapore, 11 Jln Tan Tock Seng, 308433, Singapore

^c Department of Ophthalmology, Tan Tock Seng Hospital, Singapore, 11 Jln Tan Tock Seng, 308433, Singapore

^d Department of Orthopaedics, National University Hospital, Singapore, 5 Lower Kent Ridge Road, 119074, Singapore

^e Department of Psychiatry, Institute of Mental Health, Singapore, 10 Buangkok View, 539747, Singapore

ARTICLE INFO

Keywords:

Clinical communication
Digital health

ABSTRACT

Families play an integral role in the physical and emotional recovery of patients. Studies have shown the significant impact that family plays in the overall quality of care and patient experience. Effective communication between patients' families and doctors is therefore a critical component of healthcare. Most healthcare institutions rely on a longstanding system of phone calls as the primary means of communication with families. However, this is often fraught with difficulties leading to insufficient updates, miscommunication, and grievances. This study aims to identify the shortcomings of current system of updating families and to test the feasibility of using one-way short text messages to augment clinical communication between families and doctors. The study was performed in two phases. The first phase was a survey of patients' families and doctors to identify issues with current method of phone updates and obtain information about their perceptions and receptiveness towards text messages as a mode for patient's family updates. The second phase was a pilot trial using short text messages to update patients' families. The survey showed that 69 % of doctors felt that current methods of updating families were too time consuming while 60 % of patients' families felt they were not adequately updated by the medical team. Majority of doctors and family members surveyed were receptive to the use of one-way text updates to augment communication (84 % and 91 % respectively). The pilot trial showed an increase in the percentage of families that were updated at a frequency of a minimum of twice a week, from 55.6 % to 80 % of families. Family members reported that this allowed them to receive increased frequency of updates and gained a better understanding of their family member. We conclude that one-way short text messages is a promising and feasible way to augment the current system of updating families, and to improve overall quality of care.

Introduction

Mobile technology with its increasing pervasiveness and ubiquity in our daily lives, has the potential of making a significant impact in healthcare. The use of short messaging services (SMS) and mobile applications can enhance bi-directional communication, ensure drug adherence and send reminders for follow-ups. Effective communication between patients' families and doctors is a critical component of healthcare. It can significantly influence the quality of care and the overall patient experience. This is especially so in Singapore's cultural

context, which places a strong emphasis on family involvement in patient care [1]. Families play an integral role in patients' recovery, with associated impacts on patients' mortality, morbidity and readmissions [2].

In Singapore, communication with families in the inpatient setting takes place mainly through two modalities: by bedside or through telephone calls. Bedside communication occurs when important discussions are made e.g. status of a critically ill patient, explaining role of surgical intervention, discussion regarding extend of care. Non-urgent family updates for clinically stable patients are commonly done over

* Corresponding author at: Department of Neurosurgery, Changi General Hospital, Singapore 2 Simei St 3, 529889, Singapore.

E-mail address: damian.lee.zhiquan@singhealth.com.sg (Z.D. Lee).

<https://doi.org/10.1016/j.teler.2024.100176>

Received 9 November 2023; Received in revised form 5 November 2024; Accepted 11 November 2024

Available online 29 November 2024

2772-5030/© 2024 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

the phone such as, arrangement of discharge plans, sharing of investigations done and their progress in the wards.

Updating families, however, is fraught with numerous difficulties. Organising face-to-face meetings can be challenging where both parties must find a common time to meet. This is especially so when family members are often only able to visit patients after working hours. Insufficient communication and delayed updates to family members lead to anxiety, misunderstandings, frustration, and dissatisfaction between patients' families and healthcare providers. On the other hand, doctors also experience challenges when providing family updates through telephone calls. They may face difficulty defining the scope of the update, which can result in prolonged conversations, trouble contacting family members with the need to make multiple phone call attempts to do so. This arduous and time-consuming process significantly contributes to the overall workload for healthcare professionals.

Insufficient communication within families has been identified as a significant cause of patient grievances and dissatisfaction within the healthcare sector. A study conducted by Montini et al.[3] revealed that inadequate communication was responsible for 17 % of patient complaints. A systematic review by Reader et al.[4] similarly reported that 16.8 % of patient complaints were attributable to insufficient communication.

Several studies have explored different ways of tackling this issue. In an intensive care unit (ICU), the medical team investigated the use of regular electronic written summaries to detail the progress and condition for families of patient with critical illness [5,6]. Another study provided automated text messages to families of patients undergoing operation to keep them updated about their progress and whereabouts [7]. The provision of summarised pertinent events and timely updates to families enabled family members to understand the patient's condition better. Several studies have also investigated the use of updates through text messages in the outpatient setting and was found to be well received by patients and improved clinic attendance and medical adherence [8,9,10,11]. Whilst these studies explored diverse modalities of communication tools in different healthcare setting, the use of text messaging in the inpatient setting between physicians and patients' families has not been explored in depth globally. Smartphone ownership in Singapore has been steadily increasing over the years with the latest reported figure being 97 % [12]. Doctors in Singapore's public healthcare system also utilise a secure text messaging system (TigerConnect) on their mobile device to communicate with one another and can potentially be used as a convenient modality to also provide timely updates to families through the use of short text messages. This study therefore aims to explore the use of text messages as a modality of augmenting clinical communications between doctors and patient families in the inpatient setting.

Methods

The study was designed in two phases. In the initial phase, we sought to obtain information with regard to perceptions, concerns, and receptiveness towards using text messaging as a mode of communication for patient updates. This was achieved through online surveys of both junior doctors and patients' families. Some of the patients' families were also involved in the pilot study, thus enabling us to make a comparison pre and post intervention.

In the subsequent phase, a two-week pilot study was conducted with ten enrolled patients and their respective primary spokespersons. This took place in the Neurosurgical department in Changi General Hospital (CGH), Singapore. The neurosurgical unit in CGH cares for patients that are critically ill and patients who are stable – such as admissions with minor head injuries, patients awaiting stepdown to the rehabilitation wards or discharge care planning issues. This enabled the study to include a wide range of patient types (acute, subacute, and chronic phase of their care). Updates about the patient's condition were augmented with one-way text messages over a secure institution-

approved mobile application by the team doctors. The decision on when to update patients' families was based solely on the doctor's assessment, independent of the study team. The decision to conduct this pilot trial within two weeks was to allow the study team to conduct an early assessment of families' response. This ensured that if enrolled families were dissatisfied with the investigated form of communication, it would not affect the family-doctor relationship and patient's overall care for a prolonged period. To evaluate the efficacy and reception of this method, feedback was captured from both junior doctors and the patients' families involved in the pilot study.

Ethical clearance was waived and approval to carry out this pilot study was obtained from the Chairman of the Medical Board of the study site. Privacy and confidentiality of participants were ensured through anonymization of patient identifiers.

Survey

An online survey was each conducted for the junior doctors and patient's families. For the Junior Doctors' Survey, junior doctors who were in active medical practice across a spectrum of departments within Singapore's Public Healthcare Institutions were invited to participate. In tandem, the Family Members' Survey was directed at relatives of patients who were either admitted during the survey period or had recently been admitted to a Public Healthcare Institution in Singapore (Table 1). Both surveys, conducted in English, were hosted on a secured online platform and ensured respondent anonymity. The responses to the questionnaire were a mix of free text and option of preset choices. The data collection took place from 20 April 2023 to 21 July 2023, both dates inclusive. The questions included in these surveys are detailed in Table 2.

The purposes of these surveys were to: (1) identify challenges junior doctors might face when updating family members, (2) determine if the frequency of these updates aligned with the family members' expectations, and (3) evaluate the overall receptivity towards updates provided via text messaging from both groups.

Consent was implied as participants filled out an anonymous survey. A comprehensive analysis of the responses was conducted upon the conclusion of the data collection period.

Pilot trial

The pilot trial was conducted at Changi General Hospital, Singapore from 12 July to 21 July 2023, both dates inclusive.

Inclusion criteria included patients above the age of 21 with a general ward status, patient had an appointed spokesperson above 18 years of age who was a first-degree family member, in possession of a mobile phone with internet access, and able to communicate in English

Table 1
Inclusion and exclusion criteria for survey.

Junior Doctors		Family Members	
Inclusion Criteria	Exclusion Criteria	Inclusion Criteria	Exclusion Criteria
House officer or medical officer	Doctors with no direct contact with family members (e.g. radiology, pathology)	First degree relative currently hospitalised or was hospitalised within the last 6 months	Unable to read in English
Working in a public institution hospital		Relative hospitalised in a public institution hospital	
		Participant was the main point of contact for healthcare providers for the hospitalised relative	

Table 2
Initial survey questionnaire for patients' families and junior doctors.

Survey Questionnaire for patients' families	
Duration of admission	How long was your immediate family member admitted to an inpatient ward for in their most recent admission?
Frequency of current updates	How often do you receive updates (by phone or in person) about the patient's condition during the hospitalization stay?
Satisfaction with current updates	Are you satisfied with the frequency of updates you receive from the hospital staff?
Receptivity towards text updates	How receptive are you to receiving text messaging updates from the medical team?
Desired text content	Which content will update via text be desirable?
Preferred text frequency	How often would you like to receive text message updates?
Concerns about text updates	Do you foresee any issues pertaining to updates on patients' clinical condition/progress via text message?
Survey Questionnaire for junior doctors	
Frequency of current updates	How often do you update family members of inpatients over the phone?
Update duration	On average, how much time does it take to update a family member over the phone?
Challenges of current updating methods	Do you think that the process of updating family members takes too much time? Do you think that you are unable to update family members as often as they should be updated? What are the challenges that you face when updating patients via phone?
Ideal update frequency	How often do you think that family members of stable inpatients should be updated?
Desired text content	In which of the following scenarios would an update via text be useful and appropriate?
Preferred text frequency	How useful and applicable would unidirectional text messaging be in your communication of care with family members
Concerns about text updates	Do you foresee any problems pertaining to updates on patients' clinical condition/progress via text message?

Table 3
Inclusion and exclusion criteria for pilot trial.

Inclusion criteria	Exclusion criteria
Patient age ≥ 21 , Spokesperson age ≥ 18	Patient age < 21 , Spokesperson age < 18
Any duration of hospital stay	Patient is in the Intensive Care Unit (ICU)/ High Dependency ward/ Prison ward
Has a spokesperson who: a) Owns a handphone with accessibility to the internet b) Be able to understand English c) Is a first-degree family member	Patient does not wish family member to be updated regarding inpatient stay or spokesperson is not a direct family member

(Table 3). Prior to commencing the trial, informed consent was obtained from both the patient and their designated family spokesperson. Participating spokespersons were provided one-way text messaging updates on the patient's health status through text messages. Contact details were provided if further clarification was required, family members were not able to reply to text messages.

The nature of the updates varied, ranging from patient discharge plans, information about scheduled medical investigations, notifications about family conferences, updates on non-critical clinical events, to information about the completion of an uneventful procedure or surgery. All text messages were sent using Tiger Text, which is a secure hospital-approved platform used across Singapore. At the end of the two-week trial, families were notified of the conclusion of the trial, and subsequent surveys were conducted for both junior doctors and the patients' families to glean feedback on the entire process (Table 4). The family survey assessed issues with text updates, suitable scenarios for such updates, and overall receptivity. The junior doctors' survey examined

Table 4
Post pilot trial questionnaire for patients' families and junior doctors.

Survey questionnaire for patients' families	
Duration of admission	How long did your family member stay as an inpatient?
Phone update frequency	How frequently were you updated by phone call?
Text update frequency	How frequently were you updated by text?
Issues with text updates	How did you feel that text updates
	Were there any problems encountered during the updating by text?
Desired text content	After the experience, in what circumstance are you comfortable with receiving text updates for?
Overall receptivity	After this experience, how receptive are you towards receiving updates via text?
Survey Questionnaire for junior doctors	
Overall update frequency	How often did you update family members of inpatients via all modes of communication?
Phone update frequency	How often did you update family members of inpatients over the phone?
Text update experience	How often did you update family members of inpatients over Tiger Text?
	On average, how much time does it take to update a family member over the text?
Overall receptivity	What did you use Tiger Text to update family members on? how likely are you to use text messaging as a form of communication with family members?
Pros and cons of text message	What are the benefits of using text messaging to update family members? What difficulties or challenges did you encounter when updating family members via text?
Feedback from family	Did you receive any feedback from family members regarding updating them via text messaging?

time spent texting, content shared via text messages, potential future use, and perceived pros and cons of text updates.

Results

Survey results

A total of 32 junior doctors and 44 family members were surveyed in the initial survey. Multiple issues with regards to the current means of updating families (by phone) were highlighted by junior doctors. 69 % found that the process of updating family members was too time-consuming, with 94 % citing problems such as heavy workload, 72 % stating that they were unable to contact the next of kin, 78 % citing that it was an inconvenient time for family members to receive an update (when doctors called), and 44 % reporting that they were unable to access a ward phone. Amongst family members, less than half of the family members surveyed indicated that they were satisfied with the frequency of updates that they were receiving from the team (Fig. 1).

When asked about their opinions on a text-messaging platform to update families, both doctors and family members were very supportive of the idea, with 84 % of junior doctors feeling that using text updates would be extremely useful, and 95 % of family members expressing that they would be receptive toward receiving updates via text messaging (Fig. 2).

The pre-intervention survey conducted also investigated the ideal frequency of updates to family members by both doctors and patient families. It is clearly noted that patient families would like more regular updates however doctors are unable to meet the expectations in the present circumstances (Fig. 3).

Thus, the pilot trial was set in place to evaluate if it is possible to increase the frequency of family updates to 2 to 3 times a week. Some of the scenarios where text updates were thought to be desirable included updates on the progress of stable patients, updates on normal investigation results, logistics-related matters such as the timing of family

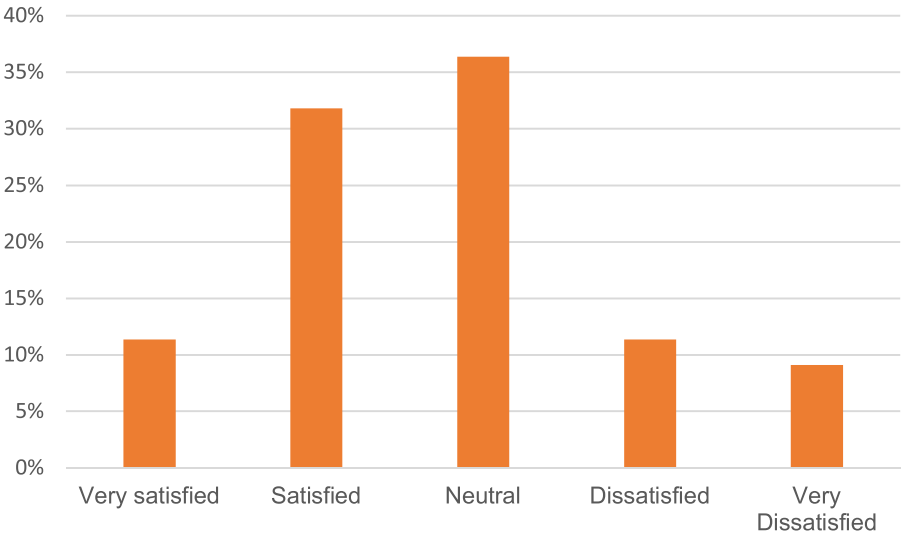


Fig. 1. Family members satisfaction with current frequency of updates.

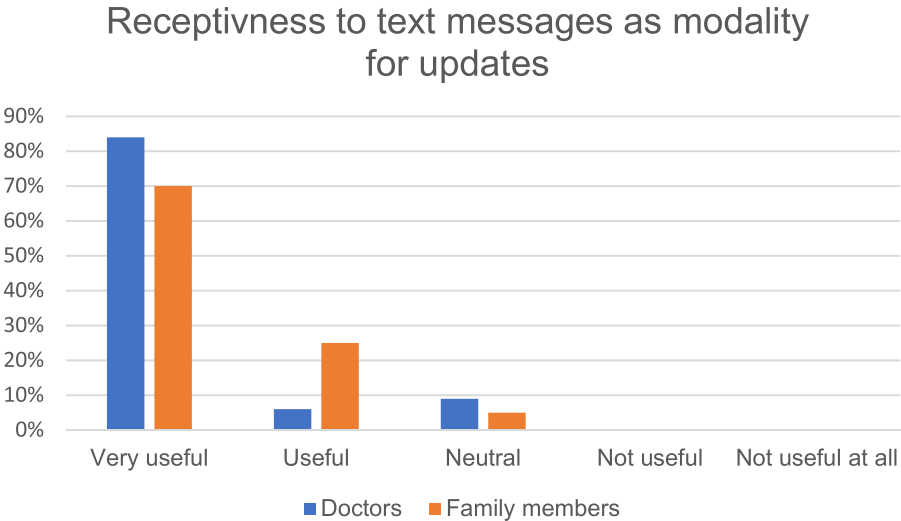


Fig. 2. Doctors and Families receptivness to text messages.

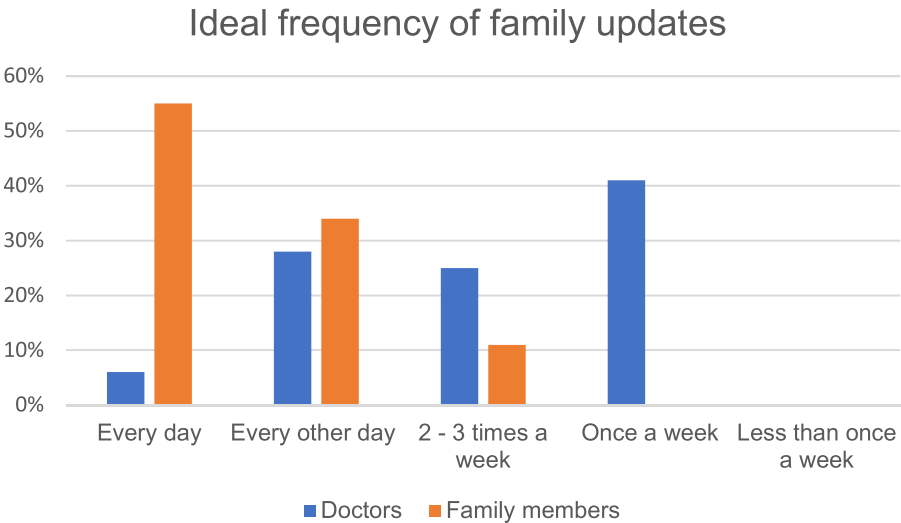


Fig. 3. Ideal frequency of updates for doctors and family members.

conferences, information that an uncomplicated surgery had been completed, information that the patient was ready for discharge or transfer the next day, and provision of details of ward location and contact details.

Pilot trial results

A total of 10 families participated in the pilot trial conducted in the Department of Neurosurgery in Changi General Hospital. They were part of the 44 participants that had participated in the pre-trial survey and completed both the pre and post-trial surveys. The duration of inpatient stay of the patients ranged from 6 days to 2 months. These families received updates from 4 junior doctors.

Following the intervention, there was an increase in the percentage of families that were updated at a frequency of a minimum of twice a week, from 55.6 % in the pre-trial survey to 80 % of families in the post-trial survey.

Feedback was obtained from the families following the trial, with mostly positive feedback received. Many commented that text updates allowed them to receive increased frequency of updates, gain a better understanding of their family member, feel more reassured, and allowed them to be contacted as well when they were unable to pick up the phone. Suggestions were also raised on when text updates should be used by the team. The results are summarized in Table 5.

Discussion

Results from the survey completed by doctors highlight the lack of time and difficulty in reaching patient families via phone call as main contributing factors to insufficient family updates. The lack of time is due to the demanding nature of work with limited time each day. Doctors would prioritize important family updates each day leaving the majority of patients who are stable with fewer opportunities for family updates. The difficulty in reaching family members compounds this issue of lack of time as doctors will have to make multiple attempts making a simple task an arduous one.

The survey revealed that 55 % of family members would ideally like an update daily but only 7 % of doctors feel that would be accomplishable. 45 % of family members however are accepting of a minimal update of at least 2 times per week of which 60 % of doctors feel that this is accomplishable. Balancing the survey results from doctors and families, our study suggests that a minimum of 2 updates per week is an acceptable frequency of update. This frequency became the gauge of success in our pilot trial which was conducted subsequently.

The implementation of the pilot trial showed that 80 % of families were updated at least a minimum of twice a week with the addition of text updates compared to 55.6 % of the pre-trial survey. Although the

team recognised that a one-way communication with family may be suboptimal, the increased frequency of communication was well received by families. All participants were in favour of still being able to receive updates even when they could not be contacted or when it is inconvenient for a phone call. This has translated into greater reassurance and better understanding of the condition of their family members. None of the family members reported needing to contact the doctors for further clarification of the text messages sent to them. The findings of our study align with those of a similar study conducted by Bruce et al. [8], where families responded positively to the use of text messaging for updates. In their study, the primary themes that emerged were the benefits of keeping family members informed, which significantly reduced their anxiety. This reduction is likely due to the consistent updates on their loved ones' progress, providing families with a clearer understanding of the patient's condition. Additionally, many families reported fewer instances of needing to call the ward, as they were kept consistently informed. Similarly, in our study, 70 % of participants reported receiving updates more frequently, and 80 % expressed feeling more reassured as a result of the text messaging system. Overall, the use of text messages for family updates has the potential to improve patient and family's satisfaction in the health care system. It had managed to prove the concept of use of text messages to augment communication with family.

Considering the sensitive nature of information that is communicated through text messages, confidentiality is of utmost importance. Verification of the recipient of the text updates is crucial to maintain confidentiality. In Singapore, a government established app named "SingPass" allows for quick and convenient verification of identification through Two-Factor Authentication (2FA). Integration of this to the communication platform would allow for a seamless and convenient way of verification of family members' identity prior to viewing text messages sent from the medical team. Confirmation of receipt of text is also important to ensure that the family is updated on the patient's latest progress. A read receipt common in current text messaging platforms can be employed to ensure delivery of text messages. Contact details of the medical team should also be provided at the end of the text so that family members can contact the team if further clarification is required.

This study highlights the potential for integrating text messaging as a standardized communication tool in hospitals. Institutional policies can be developed to formalize the use of secure text messaging for routine updates, ensuring consistent and timely communication between healthcare providers and patients' families. National health authorities can also promote the registration and use of secure digital communication platforms as part of broader digital health initiatives, thereby supporting a more cohesive digital health platform and patient-centered approach to care. This change in hospital practice can improve both patient and family satisfaction by keeping families more engaged and informed during hospital stays. Additionally, by providing an alternative method of communication that is less time-consuming than phone calls or face-to-face meetings, it may alleviate the communication burden on healthcare professionals, allowing them to focus more on direct patient care.

Limitations

The use of text messages for families is limited to families that possess the required digital literacy. However, with the growing common day use of apps on mobile phones, the use of text updates will be able to benefit most families. The authors recognise that the pilot study was performed in a single specialty which limits the translation of the results to other patient profiles such as those with shorter inpatient stay. Secondly, the authors also recognise that the pilot study took place only over a course of two week in which ten families were enrolled for the study. However, as there was limited literature for the use of short text messaging in the inpatient setting, the authors had to balance the study's goals with its potential impact on the enrolled patients' overall care.

Table 5
Most common feedback from users.

No	general theme	Proportion of families raising this (%)
How useful were the text updates?		
1	Increased frequency of Updates	70
2	Allow family members to have a better understanding of the condition of the patient	90
3	Allowed them to feel more reassured	80
4	Allowed them to be contacted even when they were not able to pick up the phone	100
When should text updates be used?		
1	Updates on progress in the ward if there are no complications	100
2	If Investigations are completed and results return normal.	80
3	When patient is ready for discharge	80
4	When a patient is admitted and details of ward location need to be provided	70

Thirdly, the authors also acknowledge that the sample size is small and with a short duration of intervention, there may be potential complications or challenges that we have not encountered. Lastly, the measured outcomes used in this study are not validated as well. Nevertheless, the results of this study lends support for further investigation of the use of text messages in other patient groups over a longer period of study.

Conclusion

This study demonstrates that, despite the best efforts of healthcare workers, families often desire more frequent updates regarding their loved ones' conditions. The current methods of communication, however, are time-consuming and labour-intensive, posing significant challenges for physicians. Implementing a one-way text messaging platform for clinical updates shows promise as an efficient and effective method to enhance the communication process, leading to greater satisfaction for both families and healthcare providers. Nevertheless, further research is warranted to validate these findings in a larger patient cohort over a longer duration. Future studies should also focus on identifying patient groups that would benefit most from this communication method, establishing clear guidelines on the type and frequency of updates, and ensuring secure methods to confirm the receipt of these messages.

CRediT authorship contribution statement

Zhiqun Damian Lee: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Huiling Linda Lim:** Methodology, Project administration, Writing – original draft, Data curation, Writing – review & editing. **Cadence Wei Lin Wee:** Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **John Tsia-Chuen Kan:** Conceptualization, Methodology, Project administration, Writing – original draft. **Chongyan Wang:** Conceptualization, Methodology, Project administration, Writing – original draft. **Kai Wen Aaron Tang:** Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

References

- [1] J.A. Chong, Y.L. Quah, G.M. Yang, S. Menon, L.K.R. Krishna, Patient and family involvement in decision making for management of cancer patients at a centre in Singapore, *BMJ Support Palliat Care* 5 (2015) 420–426.
- [2] C.R. Bruce, et al., Developing and testing a comprehensive tool to assess family meetings: empirical distinctions between high- and low-quality meetings, *J. Crit. Care* 42 (2017) 223–230.
- [3] T. Montini, A.A. Noble, H.T. Stelfox, Content analysis of patient complaints, *Int. J. Qual. Health Care* 20 (2008) 412–420.
- [4] T.W. Reader, A. Gillespie, J. Roberts, Patient complaints in healthcare systems: a systematic review and coding taxonomy, *BMJ Qual. Saf.* 23 (2014) 678–689, <https://doi.org/10.1136/bmjqs-2013-002437>. Preprint at.
- [5] J.L. Bulger, et al., Written care summaries facilitate communication between families and providers of ICU patients: a pilot study, *Crit. Care Explor* 3 (2021) E0473.
- [6] N.H. Schwartz, et al., Clinician-initiated written communication for families of patients at a long-term acute care hospital, *PEC Innov.* 3 (2023).
- [7] A. Mignault, et al., Automated Intraoperative short messaging service updates: quality improvement initiative to relieve caregivers' worries, *JMIR Perioper Med.* 5 (2022) e36208.
- [8] C.R. Bruce, et al., Design and integration of a texting tool to keep patients' family members updated during hospitalization: family members' perspectives, *J. Patient Exp.* 10 (2023).
- [9] A. Kashgary, R. Alsolaimani, M. Mosli, S. Faraj, The role of mobile devices in doctor-patient communication: a systematic review and meta-analysis, *J. Telemed Telecare* 23 (2017) 693–700.
- [10] E.M. Liederman, C.S. Morefield, Web messaging: a new tool for patient-physician communication, *J. Am. Med. Inform. Assoc.* 10 (2003) 260–270.
- [11] V.A. Yeager, N. Menachemi, Text messaging in health care: a systematic review of impact studies, *Adv. Health Care Manag.* 11 (2011) 235–261, [https://doi.org/10.1108/s1474-8231\(2011\)0000011013](https://doi.org/10.1108/s1474-8231(2011)0000011013). Preprint at.
- [12] Singapore Digital Society Report 2023. <https://www.imda.gov.sg/-/media/imda/files/infocomm-media-landscape/research-and-statistics/singapore-digital-society-report/singapore-digital-society-report-2023.pdf>.