

Caring Through Text: A Qualitative Study of Clinician-Patient Asynchronous Communication in Hospital-at-Home

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Caring Through Text: A Qualitative Study of Clinician-Patient Asynchronous Communication in Hospital-at-Home

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Abstract

Background: Hospital-at-Home (HaH) care models are increasingly adopted as a strategy to treat older adults with acute care needs and reduce strain on healthcare systems. Technological innovations, particularly digital communication platforms, have become essential in enabling care delivery beyond traditional hospital settings. Among these, asynchronous messaging tools have the potential to facilitate safe, timely, and coordinated interactions between healthcare providers, patients, and caregivers. Despite growing interest, little is known about how the content and relational dynamics of such exchanges influence care experiences in real-world HaH contexts.

Objective: This study aimed to examine the content of text messages exchanged between healthcare providers and patients or caregivers within a HaH programme in Singapore.

Methods: A descriptive qualitative design was employed to analyze retrospective WhatsApp messages exchanged between healthcare providers and patients or caregivers from August to October 2022. An inductive qualitative content analysis approach was used to systematically identify and categorize emerging patterns in the data.

Results: Three main categories were identified: (1) clinical checks and advice, (2) administrative and transport arrangements, and (3) quality of interpersonal dynamics. These were further supported by 13 sub-categories.

Conclusions: This study underscores the multifaceted role of digital communication in HaH care, demonstrating its influence beyond clinical coordination to operational efficiency and the quality of interpersonal relationships.

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Original Manuscript

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Keywords: Hospital-at-Home; digital communication; asynchronous messaging; qualitative content

analysis; remote healthcare delivery; patient-provider communication

Introduction

Globally, healthcare systems are facing increasing pressure due to constrained hospital bed capacity, rapidly ageing populations, and a growing shortage of healthcare professionals ¹. These systemic challenges have driven interest in alternative care models that enhance capacity and improve care delivery beyond the conventional hospital environment, such as the Hospital-at-Home (HaH) care model, which delivers hospital-level care to patients within the comfort and familiarity of their home environment ². Systematic reviews have shown that HaH programmes are associated with improved clinical outcomes such as shorter lengths of hospitalization stay, lower readmission rates, enhanced patient and caregiver satisfaction, and reduced healthcare costs as compared to a conventional hospital environment ^{3,4}.

Technological advancements have significantly expanded the potential of HaH care models with digital communications playing a pivotal role in enabling clinical care coordination and remote monitoring ⁵. Healthcare services can be delivered more efficiently through eHealth modalities such as mobile applications, digital communication platforms and remote monitoring devices, further improving patient outcomes ⁶. In HaH care models, digital communication platforms are commonly utilized to facilitate clinical communication such as providing clinical updates and coordinating administrative concerns ^{7,8}. Effective communication among healthcare providers, patients, and caregivers are central to the success of HaH programmes ^{9,10}. Unlike traditional inpatient care with routine face-to-face interactions, HaH relies on remote monitoring, virtual consultations, and periodic home visits to support timely information exchange ¹¹. These communication mechanisms are essential in maintaining patient safety, ensuring continuity of care, and facilitating real-time clinical decision-making in the home setting, effectively bridging hospital-level care within the home

environment and strengthening the efficiency and viability of HaH programmes^{12,13}.

While digital text messaging has become a core component of communication in HaH programmes, the actual content and dynamics of these interactions remain underexplored. Existing research has primarily focused on the operational benefits of digital tools, such as improving triage efficiency, facilitating clinical monitoring, and reducing hospital admissions, without fully examining how these platforms shape care relationships^{14,15}. To address this gap, naturally occurring text-based communication data can be explored to uncover patterns, themes, and tones between healthcare providers, patients and caregivers. Beyond identifying informational content, it can also provide insights into how trust, empathy, and clinical authority are negotiated digitally, further illuminating insights into the relational labour embedded in HaH service delivery¹⁶. Therefore, understanding these digital dialogues is crucial for refining HaH models that are not only clinically effective but also relationally responsive and ethically grounded. As such, this study aimed to explore the content of text messages exchanged between healthcare providers and patients or caregivers within the HaH programme. Specifically, it addresses the research question: *What do the content and dynamics of digital text communication between healthcare providers, patients and caregivers reveal about relational experiences in HaH programmes?* The ultimate goal is for the findings of this study to inform the refinement of current and future HaH models, emphasizing the importance of digitally attuned communication practices and providing valuable insights to enhance healthcare provider training and strengthen patient engagement.

Methods

Study design

A qualitative descriptive study design was employed to explore the content of text messages

exchanged between healthcare providers and patients or caregivers within the HaH programme. This design is appropriate as it facilitates contextually grounded analysis of naturally occurring text message communications, offering insights into the content, tone, and relational dynamics that shape communication practices in real-world HaH settings¹⁷. Standards for Reporting Qualitative Research (SRQR) checklist guided the reporting of this study¹⁸ (Supplementary File: Appendix 1).

Sampling and eligibility

A convenience sampling approach was adopted, drawing on all available de-identified text message communications exchanged between healthcare providers, patients and caregivers who participated in the HaH programme. Eligibility criteria for inclusion were (1) patients who had been enrolled in the HaH programme, (2) availability of text message records between the healthcare team and either the patient or caregiver and (3) messages that were written in English.

Setting

This study utilized retrospective data extracted between August and October 2022. Data was extracted from a digital communication platform, 'WhatsApp', used by healthcare providers and patients enrolled in the National University Health System @ Home (NUHS@Home) programme. Established in 2020, NUHS@Home delivers HaH services to acute patients who would otherwise require inpatient hospitalization. WhatsApp was used by the clinical care team with patient consent due to its high adoption in the local context, the ability to support group communication and the convenience of minimizing the need for patients to download a different application. It can be accessed via a smartphone application and serves as an asynchronous platform for clinical and administrative communication between healthcare teams and patients or their caregivers. The study team comprised an internal medicine clinician, two registered nurses, and a public health researcher specializing in qualitative methodology. The diversity in professional backgrounds offers a multidisciplinary lens, further enriching the interpretation and contextualization of communication dynamics within the HaH setting.

Ethical considerations

The study received ethical approval from the National Health Group Domain Specific Review Board (Reference Number: 2021/00896), which serves as the ethics board of the participating institution. Informed consent was waived due to the retrospective nature of the study, which involved analysis of existing data. To ensure anonymity and confidentiality, participants' data were de-identified and assigned coded pseudonyms.

Data collection

Data was extracted from 'WhatsApp' comprising all messages exchanged between the NUHS@Home team and patients or caregivers that took place between August and October 2022. The sample included conversations related to episodes of care or administrative coordination. Given the nature of this study being exploratory, there was no predetermined sample size. Instead, data collection (inclusion of text messages) continued iteratively until data saturation was achieved. Data saturation was determined when no new insights or patterns emerged from the text messages ¹⁹.

Rigor

Rigor was established using Lincoln and Guba's guidelines of credibility, transferability, dependability, and confirmability ²⁰. Credibility was enhanced through investigator triangulation during data analysis, which involved interdisciplinary team members interpreting the data. This ensured that multiple perspectives were incorporated, and findings were grounded in the evidence. Transferability was maintained by providing detailed contextual descriptions of the setting and participant characteristics, allowing readers to assess relevance to other care environments. Dependability was ensured through the comprehensive documentation of an audit trail, comprising raw text message data, coding, and analytic processes to provide transparency and consistency. Confirmability was established by maintaining a reflexive journal and performing inter-rater reliability during the research process. As emphasized by Teh and Lek, reflexivity is a vital component of qualitative research that helps to mitigate unconscious researcher bias ²¹. The reflexive

journal enabled the research team to critically examine their assumptions and decision-making, thereby enhancing the overall trustworthiness of the study ²².

Data analysis

Content analysis was employed to explore the text messages exchanged between healthcare providers and patients or caregivers within the HaH programme. This method was selected for its established applicability in analyzing communication and media-based data, making it well-suited to the study's focus on clinical text messaging ²³. Content analysis allows researchers to interpret contextual meaning through a systematic coding process, thereby uncovering patterns and themes within communication ²⁴. The three-step inductive approach proposed by Elo & Kyngäs guided the analytical process ²⁵. In the preparation phase, researchers immersed themselves in the dataset by reading the messages several times to gain familiarity and determine appropriate units of analysis. In the organizing phase, the data were segmented into meaning units and coded to capture key content. These codes were then grouped into categories and sub-categories through a process of abstraction. Finally, in the reporting phase, these categories were refined to reflect the recurring patterns present in the data. Discrepancies in interpretation were addressed through collaborative discussions among the research team, ensuring the findings were accurately and comprehensively represented.

Results

From August to October 2022, 354 patients were admitted to HaH, and all used asynchronous communication tools. The mean age of the participants was 57 (SD 17.8) years. Participants were mostly female (199, 56.2%) and the group was composed predominantly of Chinese (246, 69.5%) ethnic backgrounds (Table 1). The primary diagnosis was coronavirus - 2019 (354, 100%) and the mean length of stay in HaH was 8 (SD 4) days. A total of 1218 messages were examined and coded from the conversations between healthcare providers and patients or caregivers. The median message thread per patient interaction was 8 (IQR 13.5). Among the 1218 messages, 61.1% (n = 364) was

initiated by the healthcare providers and the remaining 38.9% (n = 232) were initiated by the patients or caregivers. The median response time for healthcare providers was 11 (IQR 21.5) minutes during office hours (0800H – 1800H) and 3 (IQR 6.25) minutes after office hours (1800H).

Insert Table 1

Three categories were identified from the analysis of the text messages, reflecting the nature of interactions between the healthcare providers and patients or caregivers within the HaH programme: 1) clinical checks and advice, 2) administrative and transport arrangements, and 3) quality of interpersonal dynamics. These categories were further supported by 13 sub-categories (Figure 1).

Insert Figure 1

Category 1: Clinical checks and advice

A total of 339 coded text messages were categorized under clinical checks and advice, which reflected a range of provider-patient communications focused on monitoring and maintaining patients' clinical stability in HaH. These were further supported by four sub-categories: clinical consultation (91 text messages), vitals monitoring by healthcare providers (157 text messages), vitals monitoring by patients and caregivers (33 text messages) and medication-related enquiries (58 text messages). These sub-categories were further elaborated through detailed codes as outlined in the coding framework in Table 2.

Insert Table 2

Clinical consultation

Three codes were used to categorize 91 text messages related to clinical consultations, which reflected patients or caregivers seeking medical input, healthcare providers offering clinical advice, and both parties exchanging updates on tests. These text messages often reflected patients or caregivers who sought clarification from healthcare providers regarding their symptoms and ongoing health concerns, particularly in situations where they were uncertain about the appropriate course of

action.

‘Hi my mum is complaining about severe pain at her neck. Do you advise us to [go to] an [accident and emergency department] A&E or [is there] any doctor to review her?’ (Caregiver A)

‘This [sharing a photo] is the diaper with blood stains, seems to be from the penile area [and the] catheter also shows some blood clots, should we be concerned?’ (Caregiver B)

Furthermore, healthcare providers offered clinical guidance on patients’ symptoms and overall well-being, and also interpreted and communicated diagnostic test results to patients and their caregivers.

‘[Team] wanted to let you know that the blood results were good [and] we are planning to drop by tomorrow to remove the PICC [Peripherally-Inserted Central Catheter] (Doctor A)

‘Hi Madam [patient], the results from today’s labs show [that] your magnesium is a little low today, so tomorrow morning we will top up with some IV [Intravenous] magnesium.’ (Doctor A)

Vitals monitoring by healthcare providers

Two codes were used to categorize 157 text messages related to vital signs monitoring by healthcare providers, which included active tracking and review of patients’ parameters such as blood pressure, temperature, oxygen saturation, and glucose levels. These text messages commonly included reminders to submit readings, follow-up assessments based on submitted data, and clinical interpretations shared with patients.

A) *'Can you help to recheck the blood pressure in 15 mins again? It is very high now.'* (Doctor A)

'Mr [patient], I would like to update you that from tomorrow onwards, you only need to submit your vital signs once in the morning will do.' (Doctor C)

Vitals monitoring by patients and caregivers

Thirty-three text messages were categorized into one code related to vital signs monitoring conducted by patients and caregivers. These messages captured instances where patients or their caregivers independently initiated the reporting of vital parameters such as blood pressure, temperature, and oxygen saturation via text messages.

'Glucose test after breakfast: 7.3 mmol/l.' (Patient B)

Medication-related enquiries

Three codes were used to categorize 58 text messages related to medication-related enquiries. These messages reflected questions from patients or caregivers regarding various aspects of medication management such as prescribed regimens, timing of administration, and potential side effects.

'May I know can I continue my Lenalidomide this evening?' (Patient C)

'Can [patient] take paracetamol for fever/headaches or not advisable due to chemo'
(Caregiver C)

Similarly, healthcare providers also provided medication guidance such as clarification of

prescribed drugs and adjustments to dosages based on patient-reported symptoms.

‘Good morning Ms [patient]. I am the nurse whom spoke to [you] earlier [and] regarding the flumucil, there will not be an issue for you to take.’ (Nurse A)

‘[You] can put ketoprofen plaster, [it] needs to be changed every 12 hourly...’ (Doctor A)

Category 2: Administrative and transport arrangements

A total of 213 coded text messages were categorized under administrative and transport arrangements, primarily reflecting logistical coordination, administrative processes and efforts to establish effective communication between the healthcare team, patients and caregivers. These were further supported by three sub-categories: logistical support and transport coordination (42 text messages), administrative transition (95 text messages) and establishing lines of communication (76 text messages). These sub-categories were further elaborated through detailed codes as presented in the coding framework in Table 3.

Insert Table 3

Logistical support and transport coordination

Two codes were used to categorize 42 text messages related to logistical support and transport coordination within the HaH model. The messages captured included arrangements for the delivery of medical devices and replenishment of consumables which were crucial to ensure efficient care delivery.

‘Mdm [patient], what time can we send over the nurse box to your house [as] we need someone to be home to receive it?’ (Doctor A)

Additionally, transport coordination emerged as a vital component with messages detailing the planning and organization of ambulance services for diagnostic procedures or transitions between care settings.

‘Hi, the team is planning for Mdm [patient] to return to NUH for dressing change for the tunnelled catheter. We will be booking [the] transport, kindly standby for the timing.’ (Doctor A)

Administrative transition

Ninety-five text messages were categorized into three codes related to administrative processes within the HaH model. These text messages often involved a range of operational and clerical activities such as coordination of patient admission and discharge procedures, completion of documentation requirements, and financial matters.

‘Could you provide me your email so we can send you the discharge documents?’ (Doctor A)

*‘Can we have [a] document [to] show [that] my father was warded at home for this period?’
(Caregiver D)*

Establishing lines of communication

Three codes were used to categorize 76 text messages capturing efforts to initiate or clarify communication between patients, caregivers, and healthcare providers. These text messages often included providing contact details, verifying preferred communication channels (e.g., text, call), and scheduling home visits.

‘Hi Mdm [patient], let me know when you [are] ready [for us to call].’ (Doctor A)

'I am the granddaughter of Mr [patient]. You may reach out if you need anything.'

(Caregiver E)

'Team, just to check will the nurse come today?' (Patient D)

Category 3: Quality of interpersonal dynamics

A total of 666 text messages were categorized under interpersonal communication quality, emphasizing the central role of relational dynamics and the multifaceted nature of interpersonal interactions within the HaH care model. These were further supported by six sub-categories: emotional support (14 text messages), appreciation (11 text messages), trust and feedback (10 text messages), courteous communication (48 text messages), communication timeliness (10 text messages) and tone and professional etiquette (573 text messages). These sub-categories were further elaborated through codes as presented in the coding framework in Table 4.

Insert Table 4

Emotional support

Fourteen text messages were categorized into one code reflecting expressions of empathy, reassurance, and encouragement conveyed by healthcare providers through text messages.

'Do not worry about the NUCOT [National University Centre for Organ Transplantation] blood test, we will do the necessary labs at home during this admission.' (Doctor A)

Appreciation

Eleven text messages were categorized into one code reflecting gratitude from patients or caregivers acknowledging the healthcare teams' dedication, responsiveness and compassion.

'Hi doctor and medical team, thank you for very much for taking care of me.' (Patient E)

Trust and feedback

Two codes categorized 10 text messages related to expressions of trust and the exchange of feedback between patients, caregivers, and healthcare providers. These text messages reflected patients' growing confidence in the clinical decisions made on their behalf and their willingness to voice concerns, ask questions and engage in open dialogue.

'My blood pressure [is] very high, 179/113 [mmHg]. I am worried.' (Patient F)

In addition to positive affirmations, a smaller number of messages conveyed dissatisfaction with aspects of care delivery. These instances of negative feedback highlighted areas where expectations were unmet and served as critical input for service improvement and patient-centered responsiveness in home-based care.

'It is not [a] problem for me to continue [to] submit the vitals. However, I need a clear direction from your side. The direction does not [seem to be] clear [and] now it's just submission of vital, if [give] wrong medication, how?' (Patient G)

Courteous communication

Forty-eight text messages were categorized into one code reflecting the consistent use of courteous language, such as expressions of gratitude and polite message closures exchanged among patients, caregivers, and healthcare providers. Patients and caregivers frequently acknowledged and affirmed the guidance provided by healthcare professionals, demonstrating attentiveness and appreciation.

'Thanks a lot and noted on this.' (Patient H)

'I am thankful to have the [healthcare] team [and] to benefit from the hospital-at-home programme, [it was] very helpful to me and my family. (Patient I)

Communication timeliness

Ten text messages were categorized into three codes that addressed the timeliness of responses exchanged between patients, caregivers, and healthcare providers within digital communication. These codes captured a subset of messages highlighting delayed responses related to administrative matters after standard office hours (1800H), involving both patients and healthcare providers.

'Hi Mr [patient], awaiting your email address.' (Doctor A)

'Sorry to revert back so late, we will discharge you tomorrow as planned.' (Doctor A)

In some instances, calls initiated by patients were not immediately answered by healthcare providers. Nevertheless, healthcare providers consistently made efforts to follow up and respond as soon as possible.

'Hi Mr [patient], we got a missed call from you. Is there anything we can help you?' (Doctor A)

Tone and professional etiquette

Five hundred and seventy-three text messages were categorized into four codes related to the tone of communication exchanged between patients, caregivers, and healthcare providers in digital messaging. The tone varied according to context with both formal and informal language observed across interactions. Formal tone was predominantly used in messages concerning clinical guidance, updates or health-related discussions, demonstrating professionalism and clarity in clinical communication. In contrast, an informal tone was more common in exchanges regarding administrative matters such as scheduling or logistics, suggesting a more conversational and approachable style suited to routine coordination.

'Good morning, would like to remind [you] to submit today's morning vitals please. Thank you.' (Doctor A)

'Hi [doctor], my dad agrees to the infusion. Please let me know the arrangements once you have the details, many thanks.' (Caregiver F)

'Hi! Btw can you please help submit the consent form again but this time in your dad's name? haha so sorry thank you!' (Doctor C)

Discussion

This study examined the content of text messages exchanged between healthcare providers and patients or caregivers within a HaH programme in Singapore offering insights into clinical communication and the relational dynamics enabling remote care delivery. To our knowledge, this is the first content analysis of asynchronous communications within a HaH service in Singapore.

Communication related to the clinical aspects of care emerged as a key category in text messages exchanged between patients, caregivers, and healthcare providers within the HaH programme. These interactions were centered on clinical consultations, where patients and caregivers

sought medical advice related to symptom management, medication clarification and general health concerns. In parallel, healthcare providers used these messages to deliver clinical updates, offer guidance and adjust care plans based on patient conditions. This closely aligns with studies conducted in the United States and China suggesting that text-based communication between clinicians and patients frequently involved symptom discussions, disease management support and medication concerns²⁶⁻²⁸. Additionally, frequent text exchanges related to the monitoring of clinical parameters such as reminders to report vital sign readings initiated by both healthcare providers and patients or caregivers were observed. These were often followed by healthcare providers' interpretations of the submitted data which subsequently guided further clinical decision-making. This communication pattern aligns with findings from a systematic review, which emphasized that remote vital signs monitoring is a foundational element of HaH programmes, facilitating the early detection of clinical deterioration and timely intervention when necessary²⁹. Collectively, these observations underscore the value of asynchronous communication as a critical enabler of clinical continuity in home-based care. Through timely and responsive digital communications, it bridges the gap between patients and healthcare providers, allowing for ongoing monitoring, real-time decision support and patient engagement that aligns with the core principles of the HaH model. As such, future research may benefit from examining how the frequency and quality of digital clinical communication can influence patient outcomes such as symptom resolution and overall satisfaction with care.

Administrative and transport arrangements were identified as another key category in this study, highlighting the importance of non-clinical operational components in enabling effective care delivery within the HaH model. Numerous text messages reflected the coordination of logistical tasks, administrative and transport-related processes. These interactions include scheduling home visits, organizing the delivery of medications and medical consumables and facilitating transitions

between care settings such as hospital discharge to home or readmission when clinically indicated. Moreover, administrative communications reflected efforts to clarify documentation requirements, streamline admission and discharge workflows and address patient or caregiver queries related to billing. These findings are consistent with studies conducted in the United States and the Netherlands, suggesting that digital messaging platforms are frequently used to manage a wide range of clerical and logistical tasks such as administrative coordination, logistical planning and transport arrangements^{30,31}. When effectively streamlined, these processes can contribute to a reduction of delays in care delivery and improved patient experiences within remote care setting³². Interestingly, qualitative studies conducted in Singapore have highlighted that logistical and operational hurdles are inevitable in the implementation of HaH programmes, potentially disrupting care continuity and resulting in delays, increased healthcare provider workload and reduced patient satisfaction^{33,34}. Therefore, addressing these issues is essential to optimize the effectiveness and scalability of HaH services in Singapore. Furthermore, the establishment of clear and reliable communication pathways between healthcare teams and patients or caregivers was also observed. These interactions included identifying preferred modes of communication, whether via text messaging or telephone calls and designating a consistent point of contact for the care team. Similarly, this is consistent with a study conducted in the United States highlighting the importance of aligning communication channels with patient preferences to enhance engagement and satisfaction³⁵. Thus, clarifying communication preferences and responsibilities not only fosters continuity of care but also supports timely responsiveness and reduces fragmentation in care delivery. All in all, these findings underscore the integral role of digital communication in supporting the administrative and logistical infrastructure of HaH models. Therefore, stakeholders may consider engaging in co-design processes with end users of HaH programmes to develop a tailored digital application aimed at streamlining operational workflows, further alleviating the administrative burden on healthcare teams while enhancing the overall patient experience and satisfaction.

Another key category identified in this study was the quality of interpersonal dynamics reflected in the digital text message exchanges between the healthcare providers, patients and caregivers. These interactions consisted of expressions of empathy and emotional reassurance from healthcare providers and words of appreciation and gratitude from patients and caregivers in response to the care they received. Furthermore, respectful and courteous language was observed across both parties, reinforcing the role of digital communication in fostering trust and mutual respect. These findings are consistent with multi-site studies conducted in Australia, Ireland, the United Kingdom, Spain and Germany, which similarly observed empathetic communication, emotional support and courteous exchanges within digital platforms^{36,37}. Moreover, the presence of digital empathy within asynchronous text-based interactions has been shown to foster rapport, encourage participant engagement and contribute to positive patient experiences in HaH models³⁸. Such relational interactions can potentially help to humanize remote care delivery and are instrumental in cultivating therapeutic alliances, which may positively influence patient engagement, satisfaction, and perceived quality of care. Furthermore, with the contemporary workforce gravitating towards asynchronous communication, professional environments have widely integrated digital tools to facilitate collaboration and optimize team productivity³⁹. Future research could explore how these relational dynamics shape the experience of patients, caregivers and healthcare providers which could inform the development of culturally sensitive communication frameworks and targeted training programmes for healthcare providers that will support high-quality relational care in digitally mediated HaH settings.

Timeliness of communication and professional tone were identified as another key category in the text message exchanges between healthcare providers, patients and caregivers in this study. Several interactions revealed delayed responses to non-clinical inquiries, particularly those sent after

standard office hours. This finding aligns with studies conducted in China and the United States which also reported frequent response delays after office hours^{26,40}. Notably, timely communication has been shown to significantly influence patient satisfaction, likely due to its role in reinforcing feelings of safety, emotional reassurance and trust which are essential qualities valued in HaH models of care^{40,41}. In addition to timeliness, the tone of communication provided further insights into the relational dynamics between healthcare providers, patients, and caregivers. Our findings highlighted that a formal tone was often used in messages on clinical care or medical guidance, reflecting a focus on clarity and professionalism. In contrast, informal tones were more frequently observed in administrative or logistical messages, indicating a conversational style. These patterns are congruent with studies conducted in the United States, which highlighted that clinically significant messages were communicated in a more formal tone, while operational matters were addressed in a neutral or informal tone^{42,43}. Together, these findings suggest that tone modulation according to message purpose may play an important role in balancing clinical professionalism with relational rapport in HaH care. Future research could explore how tone preferences vary across cultural and demographic groups and examine how tone influences perceived empathy, patient engagement, and satisfaction within digital healthcare communication.

Implications of future practice and research

Our findings suggest several recommendations to strengthen digital communication practices within HaH care. First, 2-way asynchronous communications across patients, caregivers and providers is an important enabler for HaH care delivery, enabling patients and caregivers to feel connected and supported, while allowing the HaH care team a platform to convey information quickly and effectively. Second, use of an existing platform that patients and caregivers are highly familiar with is critical to optimize their responsiveness and experience. Third, guidelines for asynchronous communications for HaH teams will be helpful to optimize clinical effectiveness and patient engagement. This may include: types of content suitable for asynchronous communication

(e.g. instructive or informative rather than discussive), language and tone (e.g. professional yet friendly), target response times and after hour response. Dedicated training may be necessary for healthcare providers on effective use of asynchronous communication tools as their utility expands.

Future research directions can explore differences in communications in older adults, how text-based relational elements such as empathy and mutual respect shape patient and caregiver experiences, and how tone preferences vary across cultural or demographic groups. Our findings also suggest a need for digital platforms that are better tailored to the operational realities of HaH care to streamline administrative tasks and reduce the burden on healthcare teams. These offer valuable opportunities to inform more patient-centred, culturally attuned, and operationally effective communication strategies that support high-quality HaH care.

Limitations

This study has several limitations. First, the dataset primarily comprised English-language communications, which may not fully capture the experiences of non-English speaking participants. This limits the inclusivity and cultural representativeness of the findings, particularly in a multilingual context like Singapore. Additionally, the sample did not adequately reflect the broader demographic trends of an ageing population, who are key users of the HaH services. Hence, future studies may benefit from purposive sampling strategies that include a more diverse linguistic and age profile, such as older adults to provide a more comprehensive understanding of digital communication in HaH care. Secondly, the retrospective nature of the text message data limits insights into the broader context of communication exchanges, as asynchronous messages may not have fully captured the full scope of interactions, particularly those that occurred following or preceding a verbal or face-to-face encounter. As such, future studies may consider triangulating message data with complementary methods such as semi-structured interviews or ethnographic observations to better contextualize communication dynamics. Third, due to the time-period of sampling, all patients were admitted for COVID-19. However, the treatment types (remote

monitoring, home visits and virtual visits) are similar to other diagnoses groups, so insights from these communications would be broadly applicable to hospital-at-home settings. Lastly, although qualitative content analysis was used to derive insights, the potential of researcher bias remains inherent due to the interpretative process. To mitigate this, systematic coding procedures and regular team discussions were employed within the research team.

Conclusion

This study offered valuable insights into the nuances of digital communication between healthcare providers, patients, and caregivers within a HaH programme in Singapore. The findings underscore the critical interplay between operational efficiency, the quality of interpersonal relationships, and clinical effectiveness in shaping the overall success of digitally mediated care within HaH settings. These interconnected elements not only facilitate seamless care coordination but also foster patient trust, engagement, and overall satisfaction. These insights underscore the need for communication frameworks and training programmes that are clinically robust, operationally efficient, and attuned to the relational dynamics essential for high-quality home-based care. As HaH models continue to expand, future research should integrate these communication principles into healthcare provider training, digital platform development, and implementation strategies to promote more person-centered, culturally responsive and sustainable care delivery.

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Supplementary Files

Figures

Categories and Sub-categories identified from content analysis.

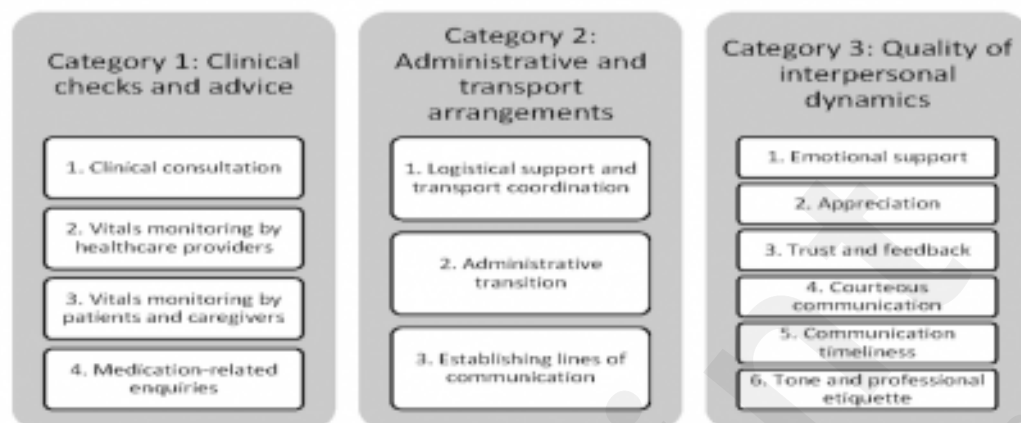


Figure 1: Categories and Sub-categories identified from content analysis

Multimedia Appendixes

Table 1: Socio-demographic, clinical & messaging characteristics of patients.
URL: <http://asset.jmir.pub/assets/4ebdf3220de4255464a282314e4e2c1b.docx>

Table 2: Coding framework for clinical checks and advice.
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Table 3: Coding framework for administrative and transport arrangements.
URL: <http://asset.jmir.pub/assets/97168ec2b0d10f54d61ede88481bbf59.docx>

Table 4: Coding framework for quality of interpersonal dynamics.
URL: <http://asset.jmir.pub/assets/f35cd7871fddab2ef01c7cb1e4b12d0f.docx>

