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Title

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Permalink

<https://escholarship.org/uc/item/8s86r4kf>

Journal

Postgraduate Medical Journal, 97(1150)

ISSN

0032-5473

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Publication Date


2021-08-01

DOI

10.1136/postgradmedj-2020-137624

Peer reviewed

Completeness and quality of text paging for subspecialty consult requests

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Received 14 February 2020

Accepted 11 July 2020

Revised 30 June 2020

ABSTRACT

It is unclear whether previously developed frameworks for effective consultation apply to requests initiated by alphanumeric text page. We assessed a random sample of 210 text paged consult requests for communication of previously described 'essential elements' for effective consultation: reason for consult, level of urgency and requester contact information. Overall page quality was evaluated on a 5-point Likert scale. Over 90% of text paged consult requests included contact information and reason for consult; 14% indicated level of urgency. In ordinal logistic regression, reason for consult was most strongly associated with quality (OR 22.4; 95% CI 8.1 to 61.7), followed by callback number (OR 6.2; 95% CI 0.8 to 49.5), caller's name (OR 5.0; 95% CI 1.9 to 13.1) and level of urgency (OR 3.3; 95% CI 1.6 to 6.7). Results suggest that text paged consult requests often include most informational elements, and that urgency, often missing, may not be as 'essential' for text pages as it was once thought to be.

possible to include everything that would be in a telephone conversation in the text page itself. Thus, when subspecialty consults are initiated by text page, they are almost always followed by telephone (or in-person) communication between the requester and the consultant.

In this context, whether text pages adhere to the essential elements of effective consultation is not known. Furthermore, it is unclear whether informational elements previously recommended as 'essential' to convey in verbal consultation interactions are necessarily the important elements to include when initiating a consult via text page (which is typically followed by a verbal interaction). In order to inform efforts to standardise and guide education surrounding effective use of text paging, in this study, we explore whether, for consults triggered via text paging, those text pages include the essential elements of effective consultation, and whether inclusion of these elements is associated with the quality of the consult request.

INTRODUCTION

Effective interdisciplinary communication is a critical component of safe and timely patient care. Inpatient consultations begin with an interaction between the requesting clinician and the subspecialty consultant. Such interactions are most effective when key informational elements are clearly communicated: patient identifying information, the reason for consult, the level of urgency and contact information of the requesting clinician. These 'essential elements' of effective consultation had been based largely on expert opinion,¹⁻³ though more recent survey-based and interview-based studies have led to the development of standardised approaches to consultation that incorporate these elements.⁴⁻⁸ These approaches were developed in an underlying context where a numeric page leading to a telephone call or in-person conversation would be the initial point of contact for communicating substantive details of the consult request.^{1-3 9 10} In recent years, alphanumeric text paging (or even direct short message service texting) has become increasingly prevalent as an alternative to numeric paging to initiate an inpatient consult. Text paging has the advantage of allowing significant informational context to be provided in the initial message itself. Text pages may be composed as free text, or in some electronic health record systems, may be automatically generated from an electronic order with preset fields completed by clinicians. Due to the limited space of the text page format, it is not

METHODS

Querying CareWeb, a web-based text paging platform in use at the University of California, San Francisco Medical Center, we extracted text pages containing the string 'consult' or 'c/s' to identify pages that could represent initial consult requests. From this extract, we eliminated those that were not sent to a subspecialty service pager. We then identified the seven medical subspecialties with the most pages in this set, in order to ensure an adequate sample for each different subspecialty. Of the pages sent to each of these subspecialties, we used the Stata 'sample' command to randomly select 30 pages per specialty as a convenience sample, for a total of 210 text pages for analysis.

Text pages were coded independently by three raters for the presence of the informational components identified in previous studies as essential elements for effective consultation: reason for consult, indication of urgency and caller contact details (name, service, phone number and pager number).^{5 7 9} A reason for consult was defined as present if the page contained either: an indication of any problem relevant to the consulted subspecialty not presented as medical history (eg, 'patient with chronic heart failure presents with melena' would be a reason for consult for gastroenterology, but not cardiology), or an indication of a problem that universally requires consultation (eg, 'patient with end-stage kidney disease on chronic haemodialysis presents with pneumonia' would be a reason for consult for nephrology). Urgency was defined as present if indicated explicitly (eg, 'stat consult' or 'non-urgent'), or if the caller



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To cite: Chu CD, Tuot DS, Harrison JD, et al. *Postgrad Med J* Epub ahead of print: [please include Day Month Year]. doi:10.1136/postgradmedj-2020-137624

indicated the timeframe within which they expected the subspecialist to see the patient (eg, 'new consult for this afternoon').

The primary outcome was mean global quality assessment, evaluated by multiple raters on a 5-point Likert scale from 'very poor' to 'very good'. No validated objective instruments currently exist for assessing the quality of text paged consult requests. A prior study of consult note quality showed a global quality score (1–5 scale) correlated well with objective measures of note quality.¹¹ Thus, we used a subjective assessment by three raters (one practising hospital medicine, two practising nephrology). Because objective measures of text page quality are not established, we intentionally did not create a rubric, as doing so would assume certain features correlated with quality. Instead, we allowed assessments to be based on clinical judgement from raters representing both specialist and primary team perspectives. Inter-rater reliability was assessed using quadratic-weighted Krippendorff's alpha, which allows for more than two raters and ordinal data, such as Likert scales.¹² We used a multivariable ordinal logistic regression model to assess associations between the data elements of a page and global quality assessment.

Use of language may affect the perceived effectiveness of a page, so as a secondary analysis, we examined paging etiquette ascertained by asking raters whether each page would be an appropriate message to send as-is to a division chief unfamiliar to the sender. We subsequently added 'paging etiquette' to the multivariable model to determine its association with page quality.

The study protocol was approved by the Institutional Review Board (IRB #18-26016) at our institution.

RESULTS

From 05 April 2017 to 17 November 2018, there were 12 290 text pages containing the string 'consult' or 'c/s', of which 3393 were pages to a subspecialty service pager. Of these, the seven medical subspecialties with the greatest number of pages were infectious diseases (n=630), nephrology (n=430), haematology/oncology (n=401), gastroenterology (n=391), palliative care (n=331), cardiology (n=267) and pulmonology (n=234). As described, we then sampled 30 pages from each of these subspecialties, yielding a convenience set of 210 text pages for manual analysis.

The proportion of pages that included each data element is summarised in table 1. The majority of the reviewed pages (81.4%, n=171) had at least four of the data elements, but only 4.8% had all six, with urgency being the most frequently omitted. The median number of elements present in a consult page was 4 (IQR 4–5).

Overall, raters felt most pages were of good quality, giving them a median score of 4 on the 5-point Likert scale (IQR 3.5–4.5). Weighted per cent agreement was 94.7%, and Krippendorff's alpha was 0.56 (95% CI 0.45 to 0.66), indicating moderate inter-rater reliability.

Table 1 Content of text paged consult requests (n=210)

Element	n	%
Requester phone number	207	99
Requester name	193	92
Reason for consult	194	92
Requester team	133	63
Requester pager number	133	63
Indication of urgency	29	14

In multivariable ordinal logistic regression, the consult request elements most strongly associated with an initial consult text page being rated as high quality were reason for consult (OR 22.4; 95% CI 8.1 to 61.7), callback number (OR 6.2; 95% CI 0.8 to 49.5), caller's name (OR 5.0; 95% CI 1.9 to 13.1) and level of urgency (OR 3.3; 95% CI 1.6 to 6.7). Presence (vs absence) of the caller's pager number was not associated with a difference in global page quality score.

Over three-quarters (79.1%) of text pages were rated as appropriate to be sent as-is to a division chief unfamiliar to the sender. When this 'etiquette factor' was added to the multivariable logistic regression model, it was independently and strongly associated with higher page quality (OR 20.6; 95% CI 9.4 to 45.6). In this model, associations between reason for consult, callback number, caller's name and level of urgency remained independently associated with global quality as well.

DISCUSSION

At our institution, among a sample of messages sent to medical subspecialists to request an initial consultation, the majority included basic contact information and reason for consult, which in this study was also the most important element associated with higher page quality.

The most influential element for page quality compared to other elements was inclusion of the reason for consult. The reason for consult is typically the pivotal piece of information that provides specialists a clinical context that frames subsequent triage, information gathering, and communication with requesting clinicians for care planning. Thus, clinical systems in which consults are initiated by computerised order entry would likely benefit from having a required field to indicate the reason for consult.

While urgency has been an 'essential element' of several previously described frameworks for effective consultation,^{5 7 9} it was infrequently indicated in the content of text paged consult requests. Furthermore, it was not as strongly associated with page quality, similar to basic contact information for the caller. It is possible that in many cases, the reason for consult itself adequately encodes the degree of urgency. It is also possible that due to space constraints of text paging, explicit inclusion of urgency may be omitted when urgency is low. This would be consistent with our low observed rates of urgency indication. Thus, although explicit indication of urgency was infrequently included, urgency is likely important but being conveyed through other means. Additionally, these results highlight a contextual difference between the text page—a one-way communication where the requester's detailed communication may be sufficient for triage—and the numeric page, where all urgency is high until the requester and consultant connect.

Our stand-in for paging etiquette, which may have related to politeness, perceived tone or grammatical/typographical correctness, was highly correlated with perceived page quality, independent of informational elements. Our assessment cannot disentangle which, if any, of these etiquette characteristics were important to this association, but future work could investigate the role of these non-informational factors in contributing to effective communication.

Our study had several limitations. First, our search terms 'consult' and 'c/s' were unlikely to be exhaustive, as not all text paged consult requests necessarily contain these terms. Additionally, subspecialists can be contacted for consult requests outside of text paging through our system, including in some cases being contacted directly on their cellphones. The CareWeb system

automatically appends patient identifying information (name, location and medical record number) to text pages, so we could not assess the contribution of these data elements to page quality. Our results were from a single centre and may not generalise to other centres or to non-academic settings, or to non-medical subspecialties. While informational elements and general etiquette are clearly an important part of consult page effectiveness, there may be other features not examined here that are important as well, particularly service- or context-specific details, and brevity. Our analyses of strict inclusion or exclusion of data elements were biased in favour of longer messages, which were more likely to include more data elements. There is likely a trade-off, or a point of diminishing or even negative returns, between the length of the initial consult question and its effectiveness as compared to a brief but focused question, followed by a more detailed conversation—a trade-off that future work could help to illuminate. Lastly, our work was limited to perceived effectiveness; future work will be needed to examine how this qualitative rating correlates to outcomes such as time to consultant response (whether by telephone call, page, in-person interaction or chart documentation) or time to a clinical intervention such as emergency surgery or initiation of dialysis.

Previous best practice recommendations for communicating with consultants have relied largely on expert opinion or surveys, perhaps due to the fact that outcomes related to clinical communication have historically been difficult to capture in practice. While such an analysis was outside the scope of this study, we demonstrate the feasibility of systematically extracting text page data to analyse patterns in usage. Going forward, the growing adoption of secure clinical communication platforms that integrate paging, text messaging, voice calling and electronic health record documentation may provide an efficient means to investigate more outcome-oriented questions and to inform the definition of standards for effective interprofessional communication applicable across a variety of domains, from documentation in the electronic health record to nurse-physician text paging communication.^{13–15}

As multiple forms of technology continue to change the format, content, and frequency of interprofessional and interdisciplinary communication, it is critical to ensure that these evolving media, when deployed in practice, are used in a way that improves patient care. Alphanumeric text paging represents a substantial portion of clinical communication in the hospital setting, and our study demonstrates that these data can be systematically extracted to examine patterns in use, ultimately to define more clinically informed standards and guide education surrounding best practices for effective use of technology for communication.

Main messages

- ▶ In a large academic medical centre, the majority of text paged consult requests included key identifying information and the reason for consult.
- ▶ Reason for consult was the most important informational element associated with overall page quality.
- ▶ Despite its prominence in educational frameworks for effective consultation, urgency of the consult request was infrequently specified.

Current research questions

- ▶ How does the content of text paged consult requests impact the timeliness, efficiency and efficacy of subsequent consultant–consulter interactions, whether by telephone, page, in-person or in the medical record?
- ▶ Does text page communication for requesting consults improve patient outcomes?
- ▶ If so, what are best practices for maximising this effect?
- ▶ Do best practices differ by what specialty is being consulted?

What is already known on the subject

- ▶ Alphanumeric text paging is an increasingly prevalent means of initiating inpatient subspecialty consultation, but has limited space for conveying detailed information.
- ▶ Existing guidelines for effective consultation are based on verbal communication and recommend that key informational elements be clearly communicated: patient identifying information, the reason for consult, the level of urgency and contact information of the requesting clinician.

Contributors Research idea and study design: CDC, DST and RRK; data acquisition: RRK; statistical analysis: CDC, DST and RRK; data interpretation: CDC, DST, JDH, JD, AL and RK; manuscript drafting and revisions: CDC, DST, JDH, JD, AL and RRK; supervision: DST and RRK. CDC is the guarantor.

Funding Dr Chu currently receives funding by the Ruth L. Kirschstein National Research Service Award (1F32DK122629-01) from the National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Competing interests Dr Khanna helped develop CareWeb, which has been licensed by Voalte. Drs Chu, Tuot, Harrison, Duong and Luxenberg have nothing to disclose.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available.

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