A survey on the educational value of an mHealth referral app for orthopaedics in South Africa

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Abstract

Background

A WhatsApp orthopaedic referral group (ORG) was created in 2017 by orthopaedic specialists at a district hospital to provide support to primary healthcare doctors in order to manage traumatic fractures and dislocations. This study assessed the educational value and user satisfaction of the ORG platform.

Methods

An online, cross-sectional survey was conducted among ORG users from May to June 2021. Demographic information, user satisfaction, the educational value of ORG, and perceived improvement in managing closed fractures and dislocations were captured using descriptive and inferential statistics.

Results

There were 80 respondents, with 50% females. The median age was 30 (interquartile range [IQR] 28–35) years, duration of practice was 5 (IQR 3–10) years, and length of ORG use was 10 (IQR 5–24) months. Seventy-two (90%) reported that ORG enabled them to receive timely advice for orthopaedic case management and 75 (93.8%) considered it an easy referral facilitation tool. Most (76.3%) felt that the advice, pictures, and videos shared on ORG helped novice doctors successfully complete fracture reduction. The percentage of participants who felt very capable in managing the following fractures increased after ORG membership: extra-articular distal radius fracture (12.5% to 45.0%, $p < 0.001$); bimalleolar ankle fractures (16.3% to 43.8%, $p < 0.001$) and shoulder dislocation (35.0% to 61.3%, $p = 0.001$).

Conclusion

ORG is an easy-to-use and well-accepted platform for the management, referral facilitation and teaching of acute orthopaedic conditions. Similar platforms can be introduced in other settings where surgical specialists are scarce. Additional studies should measure the feasibility and effectiveness of these mHealth platforms.

Level of evidence: Level 3

Keywords: mHealth, WhatsApp, orthopaedics, South Africa

Introduction

The burden of trauma and injury is significantly higher in low- and middle-income countries, yet access to timely and quality injury care is limited.[1] This is partly due to the shortage and maldistribution of surgical care providers, especially those with orthopaedic training.[2] mHealth, defined as the provision of healthcare services using mobile devices, is increasingly being used to bridge access gaps by improving communication between providers and enabling virtual patient consultations.[3,4] In addition to improving clinical care, mHealth can also be a teaching and learning platform for healthcare providers through shared communication between specialists and healthcare providers.[5] The ability of mHealth to facilitate consultations and efficient referrals in various surgical specialities, including neurosurgery, plastic and reconstructive surgery, orthopaedic surgery and paediatric surgery has been highlighted.[6-9]

WhatsApp is an encrypted smartphone app that is widely used in mHealth.[10] The clinical benefits of WhatsApp groups have been demonstrated in several studies.[8,11,12] A 2018 study showed that communications and patient triage via WhatsApp effectively reduced outpatient visits for paediatric burns and prevented unnecessary admissions.[13] The WhatsApp platform can also facilitate medical teaching and learning.[14-16] A study among resident doctors showed an improvement in knowledge of postoperative pain management following WhatsApp discussions.[14] Another study conducted among medical students documented the

potential of WhatsApp as a learning tool for community medicine.[15] There is, however, limited information on the educational value of WhatsApp in orthopaedics.

South Africa (SA) has a very high acute orthopaedic trauma burden.[17] Only 5% of the orthopaedic surgeons in SA work at public health facilities which serve 86% of the population.[18] Also, the orthopaedic surgeons in the public sector are hospital-based while many patients with acute fractures and dislocations present to primary healthcare clinics which are staffed by general practitioners and family physicians with variable orthopaedic training. In 2017, a WhatsApp orthopaedic referral group (ORG) was created by orthopaedic specialists at a first-level hospital in Cape Town, South Africa, to support primary healthcare doctors in managing closed traumatic fractures. ORG was shown to improve patient management, with 15 minutes referral response times and 42% of cases definitively managed through advice alone;[8] however, its impact on users has not been explored. The primary objectives of this study were to assess the educational value and user satisfaction of the ORG platform.

Methods

Study design, population and setting

This was a cross-sectional survey conducted with ORG users from May to June 2021. ORG was created in 2017 by orthopaedic surgeons at Mitchell's Plain Hospital (MPH), a first-level hospital in Cape Town, South Africa, as an acute orthopaedic trauma platform for primary care doctors from five referring community health centres (CHCs) to make referrals and receive advice from orthopaedic providers. CHC doctors join ORG voluntarily and discussions are visible to all ORG users.[8] At the time of this study, the specialist team responding to queries on ORG included two consultant orthopaedic surgeons and five orthopaedic medical officers.

Sample and sampling technique

All ORG users were purposively recruited. These were medical interns, community service doctors, medical officers, family physicians and emergency medicine physicians who treated traumatic orthopaedic conditions at the CHC level. As of November 2020, there were 157 ORG users. To survey at least 50% of the study population, the minimum sample size was 80. An invitation to an online survey was posted on ORG weekly throughout the six-week enrolment period. Individual invitations were not sent.

Data collection

The survey comprised 17 questions in three categories: user demographics, ORG platform usefulness/usability, and perceived clinical competence in managing selected orthopaedic trauma cases. Demographic variables included age, sex, medical qualification, duration of clinical practice and the duration of participation on ORG. A previous study demonstrated that the three most common conditions managed without onward referral (through advice only) on the ORG platform were extra-articular distal radius fracture, bimalleolar ankle fracture and shoulder dislocation. Clinical competencies in the management of these conditions before and after joining ORG were self-assessed using a six-point Likert scale. The scale ranged from grossly inadequate (1), knew the approach in theory but never practised (2), had tried before but not confident (3), still not confident (4), reasonably capable but needed supervision (5), to very capable (6).

Data analysis

The Google Docs online survey was imported into STATA SE version 15 (College Park, TX, USA) for statistical analysis. Descriptive and inferential statistics were performed. Continuous variables were presented as median and interquartile ranges (IQRs), and categorical data as counts and frequency. Self-reported competency was coded as a binominal variable (yes/no). The proportion of respondents that felt competent was then determined by those that felt competent/total respondents. Change in perceived clinical competence was determined using the two-sample proportion test. P-values < 0.05 were considered statistically significant.

Results

A total of 80 (51%) of 157 users completed the survey. The median age of participants was 30 years (IQR 28–35) and the median duration of ORG use was 10 months (IQR 5–24). There were 40 (50%) females. Half (n = 44, 55.0%) were medical officers (*Table I*).

User satisfaction with ORG

Seventy-two (90.0%) reported that ORG enabled them to receive timely advice for orthopaedic case management, and 75 (93.7%) perceived it as an easy referral tool. Only a few, 14 (17.5%), felt overburdened with the frequency of clinical queries and responses posted on ORG (*Table II*).

Educational value of ORG

Fifty-four (68.0%) felt that ORG was a good platform to keep up to date with current principles of fracture management and for

Table I: Participant demographics

	Frequency	%
Age; median (IQR) years	30 (28–35)	
Duration of clinical practice; median (IQR) years	5 (3–10)	
Duration of ORG use; median (IQR) months	10 (5–24)	
Sex		
Female	40	50.0
Male	39	48.8
Non-binary	1	1.2
Medical qualification		
Intern	11	13.8
Community service doctor	14	17.5
Medical officer	44	55.0
Family physician	8	10.0
Emergency physician	3	3.8

Table II: Satisfaction with ORG use

	Yes	Don't know	No
I receive responses on ORG soon enough to process my case in a timely manner	72 (90.0)	5 (6.2)	3 (3.8)
I find it is easy to refer my patients to Mitchell's Plain Hospital on ORG	75 (93.7)	3 (3.8)	2 (2.5)
I feel overburdened with the number of clinical queries and responses posted on ORG or receiving ORG notifications	14 (17.5)	8 (10.0)	58 (72.5)

Table III: Educational value of ORG

Educational value	n	%
Written advice, pictures and videos received on ORG to describe reduction techniques for traumatic fractures are sufficient to allow a doctor to attempt reduction for the first time in their career	61	76.3
ORG is a good way to keep up to date with current principles of fracture management	54	67.5
ORG provides on-the-job continuous medical education	54	67.5
ORG is a platform where new orthopaedic fracture management skills can be acquired	50	62.5
The learning environment is non-judgemental	46	57.5
ORG offers no educational value	5	5.0

on-the-job continuous medical education. The majority (n = 75; 95%) felt that ORG offered educational value and 61 (76.3%) of the participants felt that the advice, pictures and videos shared on ORG are sufficient to allow novice doctors to attempt fracture reduction (*Table III*).

Perceived competence in managing orthopaedic cases

The proportion of participants who felt very capable of managing extra-articular distal radius fracture increased from 10 (12.5%) to 36 (45.0%) ($p < 0.001$) after becoming ORG users. For the management of bimalleolar ankle fracture, the proportion of competent users increased from 13 (16.3%) to 35 (43.8%) ($p < 0.001$), and for the management of shoulder dislocation increased from 28 (35.0%) to 49 (61.3%) ($p = 0.001$) (*Figure 1*).

Discussion

The ORG platform was created to provide support to primary healthcare doctors in South Africa to manage acute orthopaedic trauma at CHCs. We have previously shown that ORG improves timely referral and management advice.[8] This study demonstrated that ORG is also an easy-to-use platform and provides educational value for improving clinical competency. For instance, ankle and wrist fractures were the most common fractures treated in CHCs in our study settings.[8] We found a significantly increased proportion of self-reported competence for nonoperative management of extra-articular distal radius and ankle fractures, after an average of ten months of ORG use. Likewise, three-quarters of the study participants felt that the advice provided on the platform was sufficient to enable them to perform their first closed fracture reduction. Our results support the educational value of mobile health platforms such as WhatsApp for passive medical e-learning and clinical management.[19-21]

Orthopaedic trauma management is particularly amenable to telehealth education because post-fracture reduction X-rays are an objective method of evaluating manipulation and reduction. Given the shortage of orthopaedic trainers in Africa, mHealth platforms can provide e-learning through shared messages with clinical photos, videos and case descriptions visible to all users.[18] Non-orthopaedic doctors using the platform can learn through the advice given for all the cases, not just those they post.

WhatsApp is ubiquitous in sub-Saharan Africa and requires low bandwidth, sometimes even free, making it easily accessible to doctors without the need to download additional phone apps.[22] However, the educational value of group posting of clinical information must be weighed against ethical issues such as confidentiality, privacy and consent of individual patients. WhatsApp has end-to-end encryption. In addition, ORG requires membership to join, and clinicians not involved in the direct care of a patient are not privy to their identifying information. Cases are posted without patient identifiers such as names or medical record numbers. If it is decided on ORG that a particular case needs to be referred to the district hospital, the referring doctor communicates patients' details directly to the receiving doctor by private messaging. Verbal consent to discuss clinical information and images on ORG was obtained from the patients. In the future, we may need to consider written consent to discuss patient information, even anonymously, given the more stringent privacy laws rolled out in South Africa in 2020.[23]

In addition, other mHealth platforms can be considered that restrict case discussions to only two clinicians. Vula Mobile is a referral mHealth app endorsed by the South African National Department of Health and used to refer orthopaedic patients between levels

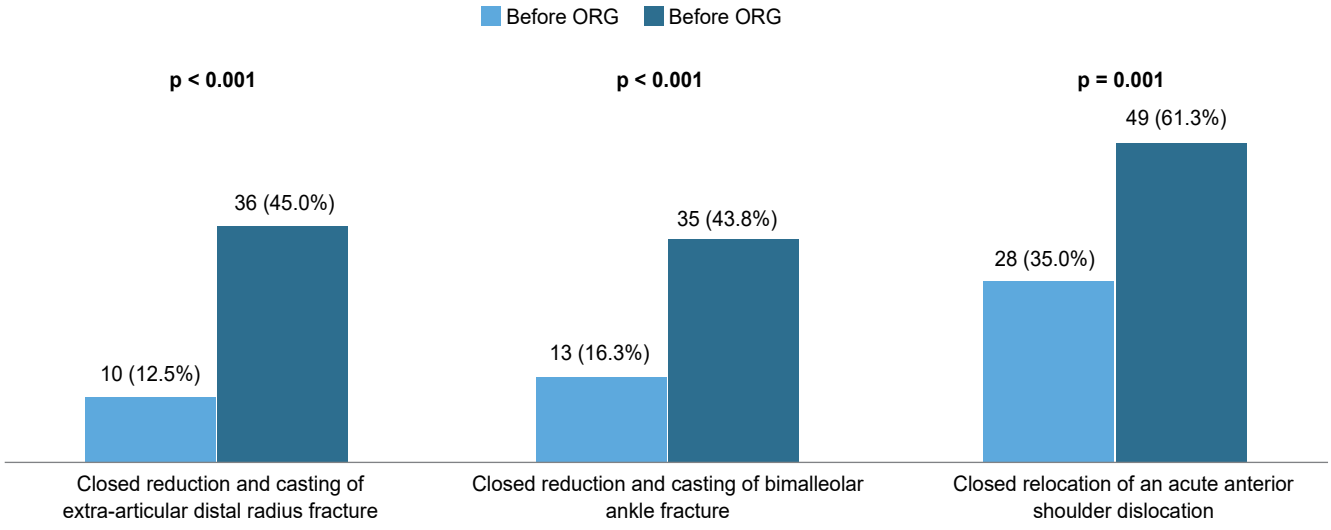

Figure 1. Changes in perceived clinical orthopaedic competence

of care.[24] This application is only accessible to registered medical practitioners, and patient information is only shared between the referring doctor and the receiving specialist. However, the platform does not allow a larger group of non-specialist providers to learn by reading the case discussion. A platform that allowed only one user and one specialist to see the active case but archived anonymous inactive case discussions visible to the larger membership could both allow better patient privacy as well as facilitate learning.

The study has certain limitations. First, clinical competence was self-reported and not independently assessed by an orthopaedic surgeon. Responses were not stratified by medical qualification, years of clinical experience, or time as an ORG user. Finally, the response rate was only 50%, so these results may not be representative of all the users.

Conclusion

This study demonstrates that a clinical mHealth platform created to improve acute orthopaedic trauma management by non-orthopaedic surgeons also has the added value of being an educational modality for its users. Cases can be reviewed asynchronously, allowing medical doctors to learn at their own pace. With anonymised patient details, this can become an effective form of continuing medical education. In other resource-limited settings where surgeons are scarce, this type of platform can expand access to nonoperative injury management through task-sharing. Additional studies are needed to measure the feasibility and effectiveness of these mHealth platforms.

Ethics statement

Ethics approval for this study was obtained from the University of Cape Town Human Research Ethics Committee (HREC REF: 199/2021). A participation information sheet was provided in the preface of the online survey, and consent was given through completion of the survey. Participation was voluntary and did not influence the ability to continue to use ORG. Responses were anonymised.

All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Declaration

The authors declare authorship of this article and that they have followed sound scientific research practice. This research is original and does not transgress plagiarism policies.

Author contributions

NJK: study conceptualisation, data management and analysis, first draft of manuscript, approval of final version of manuscript
EOO: study conceptualisation, data management and analysis, substantial contributions to the manuscript revision, approval of final version of manuscript
BS: data collection, approval of final version of manuscript
SS: study conceptualisation, approval of final version of manuscript
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