

BMJ Open Quality Empower to connect and connect to empower: experience in using a humanistic approach to improve patients' access to, and experience of, care in isolation wards during the COVID-19 outbreak in Singapore

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ABSTRACT

Patients admitted to the isolation ward during the COVID-19 outbreak face multiple psychosocial stressors including the disruptive experience of being in quarantine, anxiety over contracting a newly emerging infectious disease and limited access to their healthcare team. This quality improvement project aims to leverage on technology to improve patients' access to, and experience of, care while in isolation.

Patients admitted to two isolation wards in Singapore General Hospital (SGH) between 28 February and 19 March 2020 were each provided an iPad loaded with the MyCare application (app), curated materials and mobile games. During this period, 83 of them accessed the device and the app. MyCare app is an app developed by the nursing team in SGH as part of an existing interprofessional collaboration to help patients navigate their care during their inpatient stay. In response to COVID-19, MyCare app was supplemented with materials to address affected patients' informational and psychosocial needs. These materials included an information sheet on COVID-19, interviews with previous severe acute respiratory syndrome survivors, psychosocial support materials, and uplifting literature, illustrated storybooks and artwork.

This paper describes the process of planning for, and executing, the intervention and reports the initial results of its effect. Initial feedback indicated a positive response to the intervention. 9 out of 10 respondents (90%) rated their hospital experience with a maximum of five stars and all 10 respondents (100%) rated the psychosocial support materials with five stars. Doctors managing the patients also observed a reduction in the number of commonly asked questions following the deployment of the iPad. This quality improvement project is ongoing with plans for further research to determine how to better support the psychosocial needs of patients in isolation during a novel disease outbreak. This report is written based on the Standards for Quality Improvement Reporting Excellence guidelines.

PROBLEM

During an infectious disease outbreak, contact isolation is a key strategy in mitigating further disease spread. However, patients are often mentally unprepared for the disruptive effects of being placed in an isolation ward. Stress and negative psychological effects are increased in patients affected by a novel infectious disease, as exemplified by the 2003 severe acute respiratory syndrome (SARS) outbreak.¹ Emotional support and dissemination of reliable information can contribute to better coping with the psychological impact of a pandemic.²

When the COVID-19 pandemic began, and guided by our previous experience with SARS, we recognised the urgent need to address the psychosocial and information needs of patients in isolation amidst the context of managing an unknown infectious disease outbreak. A patient's feedback about feeling alienated in the isolation ward and having difficulty obtaining information from the medical team caring for her because of interaction minimisation—as part of infection prevention—was the impetus behind this project. Her experience echoed that of a doctor who was placed in isolation after being tested positive for SARS in 2003. She also felt disconnected and described it as 'being in a zoo with everyone staring at you through the glass, but they don't say anything' (Chow, personal communication, 12 February 2020). There was a realisation that this patient's experience was not unique, and likely a common one instead. We set out to address this problem with a quality improvement



(QI) project, driven by a commitment to excellent clinical care that includes supporting patients in managing their uncertainty and anxiety over a potentially life-threatening condition compounded by the experience of being in isolation, while adhering to infection prevention practices. The QI process enabled us to focus our aims, objectives and strategy, and quickly fine-tune our intervention with real-time feedback.

The aim of this project was to mitigate the negative impact of isolation on hospital stay of patients with COVID-19 by addressing their informational and psychosocial needs, empower and reassure them with accurate information and integrate the humanities into clinical care.

BACKGROUND

Singapore's first case of novel coronavirus infection (COVID-19) was admitted to Singapore General Hospital (SGH) on 22 January 2020. From the start of the pandemic, Singapore adopted a containment strategy with early identification of cases and isolation of both suspect and confirmed patients within the hospital.^{3 4} Singapore's containment strategies differed from other countries where only patients with more severe disease were hospitalised.⁵ For example, in the UK in March 2020, members of the public were advised to self-isolate at symptom onset and seek medical attention only if they became worse or remained ill after 7 days.⁶ In the USA, hospitalisation rate during 1–28 March 2020 was 4.6 per 100 000 population with higher hospitalisation rates among older adults with underlying medical conditions.⁷ This meant that our isolation patients' profile differed from those in other countries.

While Singapore's public health policy morphed and the venue of isolation might vary according to the patient's disease severity, with the relatively well patients cohorted in newly built community care facilities,^{4 8} the principle of immediately isolating any patient who fulfilled the criteria for suspected or confirmed COVID-19 from the general community remained unchanged throughout the COVID-19 pandemic. At the time when we planned and executed our QI project, all patients with suspected and confirmed COVID-19 were admitted to acute hospitals. They were brought in by a team of healthcare workers (HCW) dressed in full personal protective equipment (PPE)—effectively strangers to these patients—to dedicated isolation wards, hence began their isolation experience, physically disconnected from their families and support network. Non-essential encounters with HCWs were minimised; and all limited encounters were made with HCWs dressed in full PPE, adding another layer of depersonalisation to the patients' experience. They remained in the isolation wards until assessed to be clear of COVID-19 with two consecutive negative swabs. No visitors were allowed during this period, regardless of the severity of the patient's condition.

Isolation is known to negatively affect patients' mental well-being and behaviour, and is associated with depression, anxiety and anger. Patients in isolation report a poorer therapeutic relationship with their HCWs compared with those who are not isolated, since healthcare teams spend less time with isolated patients compared with the latter.^{9 10} Additionally, during a novel virus outbreak, such as the 2003 SARS outbreak,¹ patients' illness experiences unfold in a climate of uncertainty where healthcare teams and patients grapple with the unknown, which further intensifies psychological distress. This was partially attributed to being in isolation wards and lacking the support of visitors. Compared with the time during SARS, patients in this internet and smartphone era can remain connected with their social network and the world, enabling them to stay engaged even when in isolation. However, this connection exposes patients to a barrage of evolving COVID-19-related information from multiple—and at times unreliable¹¹—sources which can add confusion and exacerbate their psychological stress. Borrowing Bury's notion¹² of illness as a biographical disruption, isolation can be described as a form of social disruption because patients' normal connections to relationships and concomitant support are disrupted. We decided to leverage on digital technology for interventions that can circumvent physical barriers to bridge the disconnect and provide patients with the right information and support to empower them to cope with their isolation.

This report describes the first Plan, Do, Study, Act (PDSA) cycle of this QI initiative.

DESIGN Context

Two separate initiatives in our hospital set the precedent for this QI project. First, a nurse-led interprofessional team embarked on a pilot project in November 2018 to empower patients to take a more active role in their care journey by deploying bedside iPads loaded with designed and built in-house MyCare application (MyCare app). The app enables patients to relay specific requests to nurses, view personal clinical information such as test results and access patient education and orientation materials. Previous patient satisfaction survey on the app garnered ratings of 'Good' or above for 89% of the respondents.

Second, a Medical Humanities Programme was set up by the Medicine Academic Clinical Programme of the SingHealth Duke-NUS Academic Medical Center, which SGH is a part of, in August 2018. Technological and scientific advancements have catapulted the development of medical practice, leading to improved health outcomes and extended lifespan. At the same time, these come at a price of medicine becoming less personal as doctors increasingly rely on technology and de-emphasise human touch in their practice. The Medical Humanities Programme was set up to enhance the practice of medicine through the humanities to cultivate appreciation for

the human experience of illness and suffering. Recognising that every person's response to a difficult situation is set in the context of the sum of his lived experiences, the Medical Humanities Programme championed the adoption of an integrated medical humanities approach to provide patient-centric care.

Following the admissions of patients with COVID-19 or suspected COVID-19 in the first 3 weeks of the pandemic, a multidisciplinary project team was formed to design a digital patient support package. Motivated by the needs perceived by the HCWs practising on the ground, a team consisting of doctors, nurses, medical social workers, psychologists, health services researchers and administrative executives was formed. We used the Institute for Healthcare Improvement Model for Improvement to guide the design and implementation of the project with PDSA cycles.

Our first PDSA cycle involved an initial needs assessment and intensive planning of materials, given that this was an outbreak of a novel pathogen.

A preliminary team meeting was held on 12 February 2020. At this meeting, the team brainstormed and defined their specific concerns for patients admitted to our hospital for suspected or confirmed COVID-19 and the aim of this new QI initiative. The idea of adding curated medical humanities content to existing bedside iPads preloaded with MyCare app to be deployed to the isolation wards to address these concerns was conceptualised.

The formulation of the intervention strategies was informed by literature on patient experience which shows that well-informed patients are less anxious,¹³ and patients with a new diagnosis without previous illness experience to draw on often feel apprehensive and many of them seek both formal and informal help.¹⁴ By putting carefully curated formal information (expert knowledge) and informal information (stories of lived experiences of others overcoming similar or other major adversities) together into a common device (iPad), we intended to provide patients immediate and direct access to what they needed the most to alleviate anxiety and restore their sense of control during their isolation.

Prevailing SGH cybersecurity policy mandating internet separation meant that the iPads would be internet disabled. Approval from the hospital's senior management was obtained at the project commencement to garner financial, information technology and corporate communications support.

This QI project therefore harnessed digital technology and the nascent medical humanities platform to achieve its aim.

STRATEGY Intervention

An initial survey of doctors, nurses and medical social workers managing patients in isolation wards was conducted to assess patients' needs and elicit frequently asked questions (FAQ).

The QI project team (QIPT) met on 17 February to discuss feasible content and supportive interventions. The team then proceeded to collate the materials for uploading into the iPad (table 1). As informational needs were identified to be important in a pandemic^{2 15} and confirmed by the results of our initial survey, significant efforts were dedicated to incorporate accurate COVID-19-related information, as described in table 1. The Agency for Healthcare Research and Quality suggests various tools to help patients communicate their needs.¹⁶ Two of the tactics relevant to this project were Record Sharing, where use of the patient's medical record facilitates information sharing between the medical team and the patient; and Coached Care, where patients are prepared to be more effective participants in their care. Record Sharing is enabled by patients' access to details about their medical care via MyCare app, and Coached Care is facilitated by providing patients with responses to the FAQs to pre-empt their queries on their isolation ward stay and clinical issues related to COVID-19.

Some of the e-books and artwork were done either previously or contemporaneously with the unfolding COVID-19 situation and were created by ex-patients, healthcare professionals who have art and/or writing as hobbies. Other e-reading materials were made possible through sponsorship of publishing houses and authors of the books when they were approached by our Medical Humanities group.

The above content was gathered and sent to our Medical Informatics Support Unit on 24 February 2020, and the necessary approval for changes to the MyCare app was obtained from Apple, USA. Uploading of the contents commenced 2 days later. The iPads were then deployed in the first isolation ward on 28 February and the second isolation ward on 2 March 2020. The total duration from initiation of discussions to deployment of the iPads was 16 days.

Also, in anticipation of the needs of some of the more elderly patients who may not be savvy with mobile device, some of the above materials were made available in hard copies and discarded after use by each patient.

Independent of the QIPT's initiative, we learnt that the hospital had deployed retired nurses who were retrained for employment at the Office of Patient Experience (OPE) to telephone all isolation ward patients and check on their general well-being. The QIPT therefore collaborated with, and leveraged on the efforts of, the OPE nurses who became an information source for the QIPT regarding patients' experience on being in isolation. Additionally, the OPE staff reinforced to the patients on the availability of the iPads and MyCare app for their use, as well as obtained feedback from those who had begun using these. This allowed the QIPT to promptly review and reflect on the information gathered, and be informed of the real-time support needed to be provided, by our OPE staff. This aided identification of blind spots in our care delivery and helped guide our future PDSA cycles.

Table 1 iPad contents

Content	Short description
MyCare app	Patients can view (online supplemental figure 1): Daily schedule and medication list. Laboratory investigation results. Healthcare team composition. Patient educational material*. Patients can submit: Questions or requests to healthcare team. Requests for food, medication, amenities, room cleaning and toileting assistance. Patient feedback form*.
Games	Preloaded games.
Curated materials with medical humanities content in response to COVID-19	
Contents page†	Introduction and tips on iPad use.
Notes from healthcare‡ staff	A calming note from SGH CEO to explain the reason for patients' isolation while reassuring patients' full access to care.
Electronic card‡	E-card with encouraging messages gathered from various named healthcare professionals involved in caring for these patients.
Frequently asked questions (FAQ) sheet‡	FAQs were developed in consultation with an infectious disease specialist, with nurses and medical social workers' input to address social concerns related to sudden and unplanned hospitalisation, payment for treatment, being in isolation ward and subsequent discharge from hospital following a potentially stigmatising infection. The compiled FAQ sheets were later divided into two segments: one which addressed clinical issues and the science behind COVID-19, and another that addressed the financial and psychosocial concerns. The latter was vetted by our Corporate Communications office, which worked closely with the Ministry of Health to ensure information accuracy and consistency with the latest national or institutional policies. The answers to FAQs were kept informative and yet generic, in view of frequent emergence of new information and policy changes pertaining to COVID-19. The FAQs were originally developed in English before they were translated into Chinese. This was in response to the presenting ethnicity and language needs of the admitted patients at the time, with plans for other translations, if necessitated.
Coping with your stay in isolation	Our psychologists created the following under the heading 'Looking after Your Well-being': Looking after your well-being: normalising emotions. Navigating through challenging times (infographics)†. Six ways to cope‡. Coping skills. Relaxation exercises. Sleep hygiene. Emotional first aid. Separately, to help patients cope with their time in isolation, the Medical Humanities team curated 'Keeping Yourself Constructively Occupied', a series of materials and activities, that included: Instructions on creative digital artmaking. e-books, which consisted of appropriate fiction and uplifting illustrated storybooks. Uplifting or inspirational artwork (online supplemental figure 2). Colouring activity‡, as a journal of personal exploration (designed by our art therapists in Psychology Department). Journaling‡, with explanation of its therapeutic benefits and instructions on how to journal, with provision of online resources.
Video clips of interviews with healthcare professionals who had been infected with and survived SARS	The interviews touched on their emotional and psychological experiences when undergoing treatment for a novel infectious disease in isolation. Compilation of quotes extracted from the interviews was presented in visual forms‡ as easy-to-access resource.
Accessing counselling support†	Instructions for appointment booking with a psychologist or medical social worker for individual counselling, or signing up with a peer support group to connect with other patients in isolation ward through teleconferencing.
Cards from well wishers	Scanned copies of cards from caring members of the public who hand-delivered or mailed their words of comfort for patients with COVID-19 and HCWs.

*In addition to pre-existing function and contents, materials specifically added in response to COVID-19 needs.

†These materials were also available in hard copy.

‡An art therapy package, in the form of a printed activity book with instructions-directed colouring and colouring materials, was provided to accompany the prompt for this activity in the app.

CEO, chief executive officer; HCW, healthcare worker; SARS, severe acute respiratory syndrome; SGH, Singapore General Hospital.

Infection control

Infection prevention is of paramount importance in managing a novel virus outbreak. Hence, we needed to ensure that there were adequate disinfection protocols for the iPads to prevent the devices from becoming conduits for transmission of pathogens. A previous study by Howell *et al* investigated methods of decontaminating an Apple iPad from methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus faecium* (VRE) and *Clostridium difficile*.¹⁷ They concluded that Sani-Cloth CHG 2% wipes, Clorox and Tristel were most

effective at disinfecting an iPad against MRSA and VRE. Sani-Cloth CHG 2% had an added residual antimicrobial effect on MRSA and VRE. Tristel wipes appeared to be more effective than the other wipes when considering *C. difficile* alone. The study did not find any long-term damaging effects on the iPad after repeated usage of the Sani-Cloth CHG 2%.

Given that COVID-19 is a novel pathogen, no studies have yet been performed on the disinfection of iPad after contamination with COVID-19. Our hospital decided to disinfect an iPad and its casing with the same chemicals

Box 1 Feedback form questions

1. How would you rate your experience in the hospital (five-star rating scale)?
2. How would you rate the support materials (frequently asked questions (FAQs), information on COVID-19) available in the iPad (five-star rating scale)?
3. Please describe what materials are most useful to you, and in what ways do these help/support you?
4. Are there things that you think we should do to improve the care experience in the future for other patients like you?

used in disinfecting the patients' rooms. Schülke mikroloid sensitive wipes were used to wipe the screen while Schülke mikroloid AF wipes were used to clean the remaining parts of the iPad and its casing. Following this, the iPad was removed from the casing. With the iPad separated from the casing, the iPad underwent decontamination with the use of hydrogen peroxide vaporisation. Currently, there are no reports of any damage to an iPad due to the method of decontamination. We are presently unable to determine if regular cleaning using these agents will cause any damage in the longer term.

OUTCOME MEASURES

Multisource feedback was adopted to evaluate our QI initiative. These included:

1. Patients' digital feedback on their overall hospitalisation experience and on the support materials in the iPad gathered through a semistructured short survey form (box 1) incorporated in MyCare app.
2. Patients' verbal feedback gathered and documented by the OPE staff.
3. Doctors' serial feedback on patients' changing FAQs over time.

RESULTS

Demographics

Six hundred and thirty patients were isolated for suspicions of COVID-19 in SGH from 24 January to 19 March, of whom 24 had confirmed COVID-19 infection. Three hundred and thirty-nine (53.8%) of them were female. The median age of all patients was 40 (12–93), with males a decade older (37 (15–93) years vs 47 (12–93) years). Chinese accounted for 413 (65.5%) of them, Malays were 59 (9.3%) and other ethnicities made up 158 (25%). Confirmed cases had a median length of stay of 15 days in isolation while suspect cases had a median length of stay of 2 days.

Usage

All patients admitted between 28 February and 19 March were each provided an iPad. The iPads were placed on top of each patient's bedside cabinet in the isolation ward. As there was restricted staff and materials movement into the isolation ward, the team was unable to survey each patient and hence could not determine exactly how many

patients had accessed and read the contents. However, we were able to estimate usage of the device via 'traffic log' of the MyCare app and satisfaction level via an electronic survey form in the MyCare app. The 'traffic log' was accessed remotely via a web analytic software. Out of a total of 224 patients admitted after the initial launch of the project on 28 February, 83 used MyCare app as of 19 March. Seven patients used the app to send messages to the healthcare staff. The messages consisted of medical queries, diet orders, requests for assistance to contact a relative warded in another isolation room and notes of appreciation to the healthcare team.

Feedback

Digital feedback

Ten out of 83 patients who were given the iPads submitted feedback via MyCare app. Nine of them rated their hospital experience with five stars and one patient rated it with four stars. All 10 patients rated the support material with five stars. In response to the open-ended questions, four patients reported that the function which allowed them to check on their medical details was useful. Feedback about the support materials was overwhelmingly positive, especially for the COVID-19 FAQs and the video interviews with SARS survivors. One patient wrote that 'the COVID-19 materials here, including the FAQ and videos were helpful, because unlike the TV and Internet I know I can trust the source'.

Verbal feedback

Three patients gave feedback to the OPE staff during the study period. All of them were pleased to receive the iPad and enjoyed the humanities content and MyCare app. One of the patients said that she was 'happy to have another means to contact people besides the phone in the room'. One patient found it difficult to access MyCare app due to the requirement for two passwords and wished to be able to contact the pharmacist as well as relay more specific food and beverage requests. She used the hard copy version of the humanities content provided and found it informative.

Doctors' feedback

The doctors were polled after the introduction of the iPad in the isolation ward. Twenty doctors took care of the patients before and after the iPad deployment. Eleven of them responded to the poll, with five being aware of the deployment of the iPad within the ward. Of these five, three reported that the patients had fewer questions overall after the intervention. Two reported an improved experience running the ward while the other three who were aware of the deployment of the iPad reported no change. Two out of the five also reported that the patients had asked the medical team a different set of questions after deployment of the iPad with one citing that 'they had less questions about the disease and their care plans'. One doctor said that not all the patients used the iPad because the default language setting was English and he

was asked to assist in changing the language setting to Chinese.

DISCUSSION

Summary

Our experience with this QI project in the early stages of the pandemic showed that a coordinated interprofessional effort can produce an efficient response with just 16 days from conception to deployment of the intervention. The ethos of the institution to place patient-centred care as a priority meant that previous initiatives were built around that mission. This enabled us to adapt and apply the MyCare app quickly to enhance the care of isolated patients in the rapidly unfolding COVID-19 pandemic. To our knowledge, this is the first intervention using a mobile device to bridge the physical divide between the patient and the healthcare team, as well as to attempt to address the patients' needs holistically, in the isolation ward during this novel coronavirus outbreak. Subsequently, there have been reports of mobile devices being used for teleconsultation,^{18 19} videoconferencing between patients in isolation and their families, access to medical interpretation²⁰ and enabling virtual family presence for critically ill and dying patients in intensive care units as exemplified by the Life Lines project.^{21 22}

The initial feedback from patients who accessed the MyCare app and the curated material was overall positive. Isolated patients face physical barriers to fulfilling their informational and psychosocial needs. The positive feedback demonstrated that technology can help overcome some of the barriers of contact isolation and is especially effective for meeting information needs. The results also suggested that the humanities content offered some patients psychological support, but this effect was not as clear as the effect of satisfying information needs.

Lessons and limitations

As this project was in its first phase at the time of reporting, there were various limitations that we encountered. Since this was a new intervention and healthcare teams were busy with clinical work, not all members of the teams were aware of this project. The iPads were allocated to the patients by nurses and required an initial electronic registration. At the time of reporting, not all isolation ward patients were given the iPad. Of the patients who received the iPads, only a small number gave feedback. This could be due to difficulty navigating the preloaded material, unfamiliarity with usage of iPad or a preference for their own electronic devices. Patients also found that the available range of functions on the MyCare app were not comprehensive enough to meet their needs. For example, due to the lack of options included in the MyCare app, they were unable to make specific requests about the beverage they wanted and still required direct communication with a nurse. One patient expressed her appreciation for the printed copy of the FAQs but suggested a larger print. The iPad default setting was

in English and not all patients knew how to change the language settings on the iPad. In addition, the materials that were only available in English and Chinese in the iPad were insufficient to cater to Singapore's multiracial and multilingual culture, as proven by the evolution of the COVID-19 outbreak in Singapore.^{23 24} Although we have made translations of selected materials into Malay, Tamil, Bengali and Burmese available in hard copies at the point of manuscript writing, due to cybersecurity concerns mandating internet separation, it was challenging to upload new material or newly translated material into the iPad since uploading could not be performed remotely.

The patients' feedback is not conclusive at this point, since the amount of feedback has been limited thus far. This was partly because patients were not aware of where and how to give feedback, which we learnt subsequently when our OPE staff sought verbal feedback from patients.

While the doctors' feedback is a surrogate measure of the patients' acceptance of, and empowerment resulting from, the intervention, most of the doctors were unaware of the content of the iPad and hence might not use it effectively to enhance their care of the patients.

We also appreciated that this intervention may not be applicable to the very ill patients, such as those who required mechanical ventilatory support.

We will need a more detailed study to determine if this intervention has a true impact on countering the adverse effects of contact isolation. More studies are also needed to understand the unique needs of different patient groups of different disease severity,²⁵⁻²⁷ so that we can tweak our intervention accordingly to better address specific concerns of the different target patient populations.

CONCLUSION

The interprofessional project team recognised the complex needs of patients in isolation during a novel infectious disease outbreak which inspired this innovative project to deploy iPads to improve their communication with the healthcare team and introduce integrative medical humanities approach to addressing their psychosocial needs. Patients who used the iPads were satisfied with MyCare app and the curated contents.

The first phase of this project was planned and rolled out in a short period of time with the awareness of the rapidly changing situation surrounding COVID-19 outbreak. Key factors that enabled the success of the first phase included an efficient, combined interprofessional effort, senior management support and funding, the prior availability of the iPads and MyCare app and the shared values of the Medical Humanities team. Going forward, we will have to refine the work processes to enable more patients to benefit from the intervention, engage the primary healthcare teams to better advocate the use of the iPads and gather feedback from patients to improve the curated content and usability of the MyCare app.

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REFERENCES

- Chua SE, Cheung V, McAlonan GM, *et al*. Stress and psychological impact on SARS patients during the outbreak. *Can J Psychiatry* 2004;49:385–90.
- Sim SS, Chan YH. Psychological impact of the SARS outbreak on a Singaporean rehabilitation department. *International Journal of Therapy and Rehabilitation* 2004;11:417–24 <https://research.monash.edu/en/publications/psychological-impact-of-the-sars-outbreak-on-a-singaporean-rehab>
- Ng Y. Evaluation of the effectiveness of surveillance and containment measures for the first 100 patients with COVID-19 in Singapore — January 2–February 29, 2020. *MMWR Morb Mortal Wkly Rep* 2020;2:69.
- Lin RJ, Lee TH, Lye DC. From SARS to COVID-19: the Singapore journey. *Med J Aust* 2020;212:497–502 <https://www.mja.com.au/journal/2020/212/11/sars-covid-19-singapore-journey>
- Centers for Disease Control and Prevention (CDC). Coronavirus disease 2019 (COVID-19), 2020. Available: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html> [Accessed 2 Nov 2020].
- Razai MS, Doerholt K, Ladhani S, *et al*. Coronavirus disease 2019 (covid-19): a guide for UK GPs. *BMJ* 2020;368:m800 <https://www.bmj.com/content/368/bmj.m800>
- Garg S, Kim L, Whitaker M, *et al*. Hospitalization Rates and Characteristics of Patients Hospitalized with Laboratory-Confirmed Coronavirus Disease 2019 - COVID-NET, 14 States, March 1–30, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:458–64.
- CNA. COVID-19: community isolation facility at Singapore Expo operational from Apr 10. Available: <https://www.channelnewsasia.com/news/singapore/covid-19-community-isolation-facility-at-singapore-expo-12626324> [Accessed 22 Nov 2020].
- Abad C, Fearday A, Safdar N. Adverse effects of isolation in hospitalised patients: a systematic review. *J Hosp Infect* 2010;76:97–102.
- Soon MML, Madigan E, Jones KR, *et al*. An exploration of the psychologic impact of contact isolation on patients in Singapore. *Am J Infect Control* 2013;41:e111–3.
- Tagliabue F, Galassi L, Mariani P. The "Pandemic" of Disinformation in COVID-19. *SN Compr Clin Med* 2020;1287–9.
- Bury M. Chronic illness as biographical disruption. *Social Health Illn* 1982;4:167–82.
- Legg AM, Andrews SE, Huynh H, *et al*. Patients' anxiety and hope: predictors and adherence intentions in an acute care context. *Health Expectations* 2015;18:3034–43.
- Herxheimer A, McPherson A, Miller R, *et al*. Database of patients' experiences (DIPEX): a multi-media approach to sharing experiences and information. *The Lancet* 2000;355:1540–3.
- Chew QH, Wei KC, Vasoo S, *et al*. Narrative synthesis of psychological and coping responses towards emerging infectious disease outbreaks in the general population: practical considerations for the COVID-19 pandemic. *Singapore Med J* 2020;61:350–6 <http://www.smj.org.sg/article/narrative-synthesis-psychological-and-coping-responses-towards-emerging-infectious-disease>
- Tools to help patients communicate their needs. Available: <http://www.ahrq.gov/cahps/quality-improvement/improvement-guide/6-strategies-for-improving-communication/strategy6htools.html> [Accessed 23 Nov 2020].
- Howell V, Thoppil A, Mariyaselvam M, *et al*. Disinfecting the iPad: evaluating effective methods. *J Hosp Infect* 2014;87:77–83.
- Wittbold KA, Baugh JJ, Yun BJ, *et al*. iPad deployment for virtual evaluation in the emergency department during the COVID-19 pandemic. *Am J Emerg Med* 2020;38:2733–4.
- Lowe J, Shen S. Off the shelf: rapid deployment of an emergency department telemedicine platform using readily available consumer products. *J Emerg Med* 2020;59:726–9.
- iPads are crucial health care tools in combating Covid-19. wired. Available: <https://www.wired.com/story/ipads-crucial-health-tools-combating-covid-19/> [Accessed 4 Nov 2020].
- Rose L, Cook A, Casey J, *et al*. Restricted family visiting in intensive care during COVID-19. *Intensive and Critical Care Nursing* 2020;60:102896 <http://www.sciencedirect.com/science/article/pii/S0964339720300999>
- Life Lines | King's Health Partners | London. Available: <https://www.kingshealthpartners.org/our-work/lifelines> [Accessed 23 Nov 2020].
- RSIS. Global health security – temporary closure of Mosques: Sharia flexibility in Singapore. Available: <https://www.rsis.edu.sg/rsis-publication/icpvtr/global-health-security-temporary-closure-of-mosques-sharia-flexibility-in-singapore/#.X7qqUsgzY2x> [Accessed 23 Nov 2020].
- Koh D. Migrant workers and COVID-19. *Occup Environ Med* 2020;77:634–6.
- Rosenbluth G, Good BP, Litterer KP, *et al*. Communicating effectively with hospitalized patients and families during the COVID-19 pandemic. *J Hosp Med* 2020;15:440–2.
- ten Hoorn S, Elbers PW, Girbes AR, *et al*. Communicating with conscious and mechanically ventilated critically ill patients: a systematic review. *Crit Care* 2016;20:333.
- Fang J, Liu Y, Lee E, *et al*. Telehealth solutions for in-hospital communication with patients under isolation during COVID-19. *WestJEM* 2020;21:801–6.

Supplement

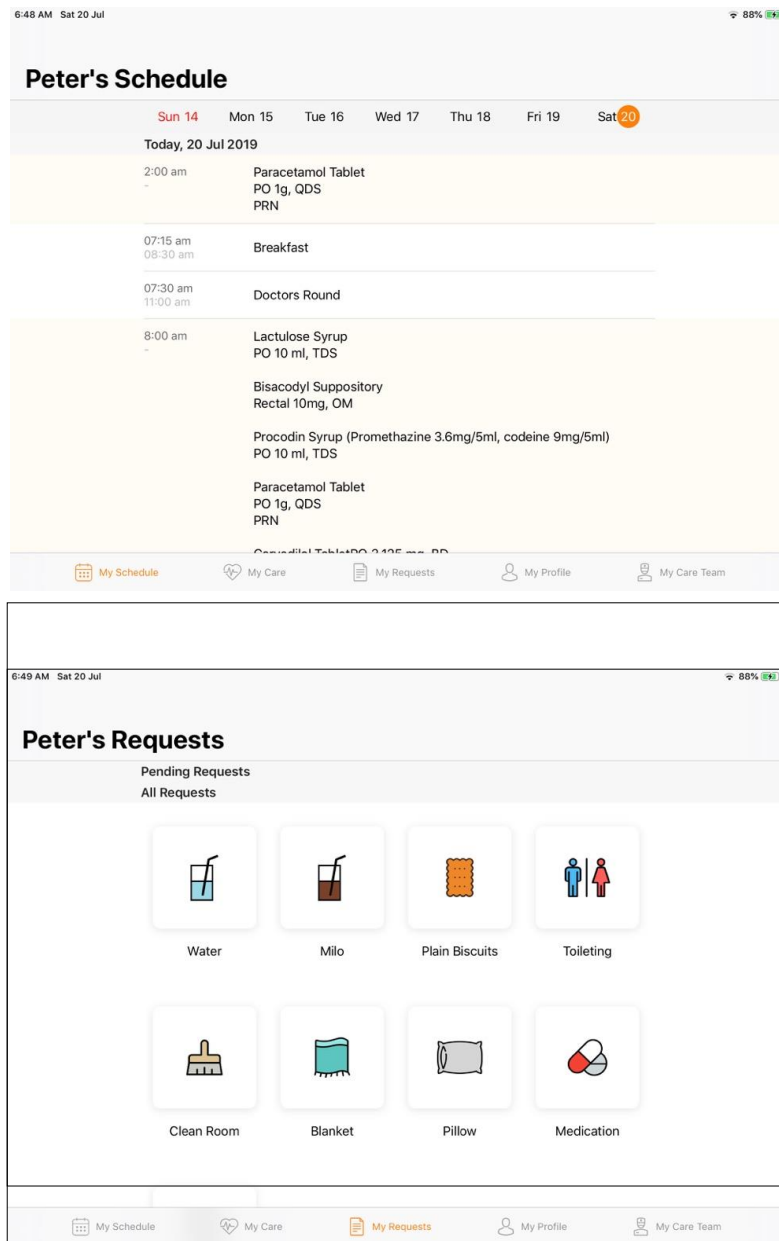


Figure 1. Sample screenshots from MyCare app



Figure 2. Encouraging cartoons drawn by medical social workers Sarah Lee and Yeda Ko