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Lessons learned from the anti-SARS quarantine experience in a hospital-based fever screening station in Taiwan

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Background: Severe acute respiratory syndrome (SARS) was the first major novel infectious disease to hit the international community in the 21st century. It alarmed the world with its high infectivity and significant mortality; the lack of a rapid, reliable diagnostic test; and the lack of effective specific treatment and vaccination. A prominent feature of SARS was nosocomial clustering with transmission to health care workers, patients, and visitors. Until the outbreak struck Hong Kong's and Taiwan's hospitals, it had not yet been identified as a dangerous disease. Hospital outbreaks of SARS typically occurred within the first week after admission of the very first SARS cases. Doctors and nurses were unaware of the need to isolate probable cases and to protect themselves, thus becoming the first victims. According to existing evidence, persons with related symptoms who have cared for, lived with, or had direct contact with the respiratory secretions or body fluids of a suspected or probable case of SARS would be contagious and could transmit the disease by close contact. However, the public became panicky because the media repeatedly reported the increasing probable cases. To control the epidemic, all countries infected with SARS implemented several public health measures, including heightened infection control measures and aggressive quarantine measures. Quarantine has been defined as the confinement and separation of subjects suspected to transmit a contagious disease. It differs from the term “isolation,” which means the isolation of subjects already known to be infected with a contagious disease to prevent them from transmitting disease to other people. Quarantine was no longer used after the mid-20th century because of the discovery and development of antibiotics and vaccinations, but bioterrorism and devastating diseases such as SARS have revived this antiquated practice, even for entire cities.

Beginning on March 18, it was dictated in Taiwan that all persons who had been in close contact with a
SARS patient should be quarantined for 10 to 14 days in accordance with the incubation period for SARS. In addition, once a person with fever visited a clinic or outpatient department, he or she was referred to a SARS preliminary diagnostic hospital with an outside fever/cough-screening station in a quarantine area inside tents or steel-built houses. Physicians made detailed diagnostic examinations and related treatments and decided whether to discharge, hospitalize, or refer the individual to negative-pressure isolation wards. Although only a small percentage of persons quarantined had suspected or probable SARS diagnosed subsequently, and a smaller percentage had a laboratory-confirmed case of SARS, the use of quarantine might have prevented an infected individual from exposing others and generating successive waves of infection.

The research on quarantining has mainly focused on 2 aspects: anti-SARS strategies and the responses of the quarantined. Studies related to anti-SARS strategies addressed decision making, cost-effectiveness, and the management and ethics of quarantine strategies. Other studies investigated the responses of the quarantined, such as compliance, risk perceptions, and psychologic effects. Moreover, most of these studies focused on home quarantine based on data collected in the post-SARS period rather than hospital-based quarantine. In contrast, few studies explored the hospital-based quarantine experience from patients’ point of view during the SARS outbreak. Therefore, we undertook this qualitative study to explore patients’ quarantine experience in a fever screening station of an emergency department (ED) during the SARS outbreak. The aim of our inquiry was to develop a better understanding of how to provide humanistic quarantine care and education in relation to infection control and quarantine measures in a health care delivery system.

METHODS

Research design

This study used a phenomenologic design to understand the lived experience of people who had experienced quarantine in a fever screening station of an ED during the SARS outbreak. Phenomenologic approach was chosen to understand the phenomenon from the perspective of study informants. Specifically, Colaizzi’s methodology was adopted to approach directly the participants’ experience by interviews with a semistructured guide. Colaizzi’s phenomenology was chosen for 2 reasons. First, the task of phenomenology is to investigate and describe all phenomena, including all kinds of human experience, as these phenomena appear in their fullest breadth and depth. Second, Colaizzi’s method addresses the subjects’ original descriptions of their own experience and considers it necessary to formulate and integrate exhaustive descriptions of phenomena into the whole understanding.

Setting and sample

The setting for this study was the 50-bed ED of a 600-bed, regional teaching hospital in central Taiwan. The ED had 6 beds for quarantine care. On average, 13 patients with fever were quarantined each day during the research period (April 24 to May 17, 2003). The ED nursing staff had a mean age of 24.25 years, had an average 3.06 years of professional nursing experience, 62.7% had graduated from nursing college, and 37.5% had bachelor degrees in nursing.

Permission for this study was obtained from the participating hospital’s institutional review board. All participants in this study had experienced quarantine in

![Fig 1. Time sequence of SARS outbreak related to this study.](image-url)
the ED for at least 2 hours. Patients were excluded if they had a history of psychiatric illness or were younger than 15 years old. All participants were provided with consent forms and were informed that the quotations from interviews would be anonymous. Of 60 patients who were approached in the fever screening station by a senior ED staff nurse, 17 volunteered to participate.

Data collection

Conforming with universal infection control policy, we collected data through telephone interviews from April 24 to May 17, just at the SARS outbreak period in Taiwan. To facilitate participants’ description of their quarantine experiences, we used a semistructured guide for interviews. Each participant was called after she/he left the quarantine station and interviewed with the following questions: could you describe the process and situation in which you were quarantined? What kind of health care services did you experience during the quarantine, and how did you feel then? What did you think about the quarantine policy? Is there anything else about the quarantine you want to say? The interview lasted 30 minutes to 1 hour and was tape-recorded. The interviewer, a senior ED staff nurse with a nursing bachelor degree, was continuously supervised by the research team leader.

Data analysis

Within 24 hours, audiotapes were transcribed verbatim and initially analyzed by a clinical research staff from the research team. Data analysis was guided by Colaizzi’s 9 steps: (1) read all participants’ descriptions to acquire a feeling for them, (2) extract significant statements from each verbatim transcript, (3) spell out the meaning of each significant statement (formulate meanings), (4) organize the formulated meanings into clusters of themes, (5) validate theme clusters by referring to the original verbatim transcripts, (6) note discrepancies among and/or between various clusters, (7) integrate results into an exhaustive description of the phenomenon under study, (8) formulate this exhaustive description of the phenomenon as unequivocally as possible, and (9) ask participants to validate the findings. Through 11 research meetings, the clusters of themes were formulated and integrated.

RESULTS

The 17 patients with fever recruited into this study had a mean age of 34.1 (range, 18-62) years. The majority of participants was male (70%), approximately 50% were married, 50% had a senior high school education, 40.7% were unemployed, and 46.8% had low to moderate work incomes. Two participants had previously received compulsory home quarantine, and the rest (88.2%) had never experienced quarantine. The mean quarantine time in the fever screening station for our 17 participants was 4.2 (range, 2-13) hours. Analysis of interview data on the quarantine experience identified 2 categories with 6 themes (Fig 2), which are described below with examples from transcripts.

Category 1: External burden

Bearing the uncomfortable surroundings.
Ten participants mentioned the physical environment of the quarantine area as difficult to tolerate. The most common complaints were “too cold during the night, sweltering and stuffy during the day, no food provided, no water to drink, many mosquitoes, and inconvenient toilet access.” Other complaints were more specific, eg, “That night, the wind was so strong that I could not sleep.” Another participant said, “My headache was so severe, and it was so stuffy there during the afternoon. It was too much for me to stand!” On the other hand, 3 participants described helpful nursing care: ice-pillow used, supplied water for drinking, added a blanket to warm up, came to ask about my needs and situation, held my hands and sat with me for a while, and explained the situation.

In addition, each patient had other physical symptoms besides fever. Four participants expressed...
The quarantine policy is very important for SARS prevention. As one of them said, “Their eyes really terrified me. I seemed to be a real SARS patient.” Although many participants had a negative experience of facing others, some reacted differently: “I didn’t care about that [others’ discrimination] very much. That didn’t matter! I told myself that I was just temporarily receiving medical treatment.”

Lacking in-person family support. Some participants wanted their family to accompany them during the quarantine to decrease their loneliness and share worries. In contrast, some refused because they were afraid of family members being infected by SARS. One participant received family support by cell phone: “My family gave me food and water through the nurse, and I told them about my situation by cell phone. That way, they worried less, and I was less anxious.”

However, 3 elderly participants without cell phones couldn’t leave the quarantine area to use the public telephone; thus, they were unable to reach their families until allowed to leave.

Category 2: Internal struggle

Struggle with being quarantined. Although most participants knew that the quarantine was the national SARS prevention policy, half of them still experienced conflict in accepting their own quarantine. Most of them expressed feeling unprepared for quarantine, half disagreed with the quarantine justification, and 2 were unfamiliar with the quarantine policy. Four participants disagreed with the quarantine, apparently because medical professionals provided insufficient information. One of them admitted, “I feared so much that I was isolated with SARS patients. Moreover, I doubted whether the beds or chairs at the quarantine room were completely decontaminated.”

However, the rest of the participants agreed and accepted the quarantine because of altruism and recognition of the quarantine strengths. As one of them said, “The quarantine policy is very important for SARS prevention. It could screen for high-risk populations and provide us an outside isolated room for examinations and observations, thus decreasing the SARS epidemic in the hospital. So I was willing to accept that.”

Struggle with emotional turmoil. During the quarantine period, participants experienced several intertwined emotions: anger, anxiety, fear, loneliness, guilt, uncertainty, worry, threatened feeling, and loss of control. These emotions might have resulted from disagreement with the quarantine, insufficient knowledge about the quarantine and SARS, the possibility of being diagnosed SARS or infected by others, disruption of their duties/roles and normal life, no in-person contact with significant others, limited space and movement, dissatisfaction with medical care, uncomfortable physical symptoms, and inhospitable quarantine environment. A 40-year-old man who worked in a factory said: “I had to work during that time. But nobody told me when I could go home until 10 hours later. I was very angry about waiting.” Another young girl said, “Nobody except the nurse would come near you. I felt so lonely and scared.”

Furthermore, a majority of participants experienced uncertainty. For example, one participant said, “They took me to that quarantine room, only asked me to lie down on the bed, and not to go outside except to the toilet by following the yellow line on the floor. You never knew about the next step and how long you would wait.”

Struggle with possible SARS diagnosis. Each participant mentioned feeling very afraid of being diagnosed with SARS during the quarantine period and were burdened by this shadow. Finally, all of them were completely relieved when SARS was ruled out. At the same time, they were informed of the quarantine ending. Many participants used “big stone” to describe their laden worry about being diagnosed with SARS. As one participant said, “The ‘big stone’ was finally thrown down the moment that doctor told me, ‘You have been excluded from a diagnosis of SARS.’”

**DISCUSSION**

Under the SARS threat, quarantine was a public health tool to prevent infectious diseases. Persons with fever were quarantined in an outside fever screening station of SARS preliminary diagnostic hospitals. The epidemic revived our examination of this defunct practice. For those involved in controlling hospital infections, SARS represents one of many new challenges: to examine infection control strategies, alert mechanisms, response capability, and to repair any identified inadequacies. Focusing on these challenges will help us to conquer future epidemics.9,16,21,22

Our analysis of participants’ interviews showed that quarantine experience in a hospital-based fever
screening station had 2 aspects. Externally, they were burdened by uncomfortable surroundings, others’ discrimination, and lack of in-person family support. Internally, they struggled with accepting the quarantine, emotional turmoil, and possible SARS diagnosis. Our findings were similar to the psychologic impact of quarantine on 19 Canadians: fearfulness, loneliness, anxiety, insomnia, boredom, anger, uncertainty, and stigmatization. 

To experience quarantine was not easy for patients who were battling heavy emotional turmoil under the strict infection control policy. Like other quarantined persons in relevant studies, some participants perceived risk, felt doubt, and were reluctant to accept being quarantined owing to insufficient or inadequate information about SARS and quarantine policy. In order to effectively implement infection control policy, it is imperative to increase the quarantined person’s and the public’s understanding of the quarantine measure in controlling infectious disease. In addition, some quarantined participants in this study did not seem to meet the quarantine criteria. Wang et al’s study suggested that targeting quarantine efforts to persons with known or suspected exposure to SARS cases would improve the efficiency of SARS quarantine.

Concerning the limitations of this study, the small sample potentially limits the applicability of our results. Furthermore, short-term quarantined experience in a hospital-based unit in our study may not be equivalent to the quarantine experience in different situations (ie, home or airport) or in different time spans.

Implications for practice

Quarantine was not a common health measure in Taiwan prior to the SARS outbreak. As pandemics continue to threaten the world, as in the recent emergence of the H1N1 virus, this study provides some implications for the practice of infection control. Adequate planning should be undertaken for the arrangement of physical settings and equipment for emergencies requiring quarantine measures, eg, equipment for temperature control (like electronic fans and blankets), portable toilet, telecommunication, privacy, and mosquito prevention. Temporal and sterilized cell phones will assist the quarantined to communicate with and get information and emotional support from health care workers and family members without increasing contamination risks. Furthermore, it is important to meet the basic physical needs of the quarantined, such as meals, water, and symptoms management, and to treat SARS-related symptoms as well as non-SARS-related symptoms.

In addition, sufficient information related to quarantine needs to be provided, such as reasons for being quarantined and its effectiveness for the public infection control, the procedures they will experience, the persons and methods they could call for help, and further explanations for the ongoing situation and changes. Moreover, it is cost-effective to focus quarantine efforts only on persons with known or suspected exposure to SARS cases. This will also prevent possible ethical controversies from arising.

Although logistical dilemmas will always exist, we call on hospitals to reconsider and redesign their infection control systems and balance between implementing efficient and complete infection control and providing humanistic care. The results of our study may help sensitize health care professionals to empathize with quarantined persons while providing quality quarantine care and meeting specific needs related to the environment, education, emotional support, and stress management.

References

1. World Health Organization. Update: outbreak of severe acute respiratory syndrome—worldwide, 2003. MMWR CDC Surveill Summ 2003;52:269-72.
2. Center for Disease Control. ROC. Update: report of severe acute respiratory syndrome. Taiwan Epidemiol Bull 2003;19:272.
3. Center for Disease Control. ROC. Global SARS outbreak: Taiwan experience. Taiwan Epidemiol Bull 2003;19:311.
4. Tsang KW, Mok TY, Wong PC, Ooi GC. Severe acute respiratory syndrome (SARS) in Hong Kong. Respirology 2003;8:239-65.
5. Cyranoski D. China joins investigation of mystery pneumonia. Nature 2003;422:459.
6. Lam WK, Zhong NS, Tan WC. Overview on SARS in Asia and the world. Respirology 2003;8:52-5.
7. Stadler K, Massignani V, Eickmann M, et al. SARS—beginning to understand a new virus. Nat Rev Microbiol 2003;1:209-18.
8. Lee N, Hui D, Wu A, et al. A major outbreak of severe acute respiratory syndrome in Hong Kong, N Engl J Med 2003;348:1986-94.
9. Ho PL, Tang XP, Seto WH. SARS: hospital infection control and admission strategies. Respirology 2003;8:541-5.
10. Gensini GF, Yacob M, Conti AA. The concept of quarantine in history: from plague to SARS. J Infect 2004;49:257-61.
11. Lee ML, Chen CJ, Su JI, Chen KT, Yeh CC, King CC, et al. Use quarantine to prevent transmission of severe acute respiratory syndrome—Taiwan, 2003. MMWR 2003;52:680-3.
12. Day T, Park A, Madras N, Gumel A, Wu J. When is quarantine a useful control strategy for emerging infectious disease? Am J Epidemiol 2006;163:479-85.
13. Bensimon CM, Upshur REG. Evidence and effectiveness in decision making for quarantine. Am J Public Health 2007;97:544-8.
14. Cava MA, Fay KE, Beanlands HJ, McCay EA, Wignall R. Risk perception and compliance with quarantine during the SARS outbreak. J Nurs Scholarsh 2005;37:343-7.
15. Hawryluck L, Gold WL, Robinson S, Pogorski S, Galea S, Spyra Y. SARS control and psychological effects of quarantine. Toronto, Canada. Emerg Infect Dis 2004;10:1206-12.
16. Peng YC, Tsai JCH, Lin ECL. Patients’ psychological impact and service satisfaction for SARS quarantine in emergency department. J Emerg Med 2003;6:331-42.
17. Forman J, Creswell JW, Damschroder L, Kowalski C, Krein S. Qualitative research methods: key features and insights gained
from use in infection prevention research. Am J Infect Control 2008; 36:764-71.

18. Ray M. A philosophical method to study nursing phenomena. In: Lei-
ninger M, editor. Qualitative research methods in nursing. Orlando,
FL: Grune & Stratton; 1985. p. 81-92.

19. Colaizzi PF. Psychological research as the phenomenologist views it. In: Val-
le RS, King M, editors. Existential-phenomenological alternatives for psychology. New York: Oxford University Press; 1978.

20. Omery A. Phenomenology: a method for nursing research. Adv Nurs
Sci 1983;5:49-63.

21. Maunder R, Hunter J, Vincent L, et al. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospi-
tal. Can Med Assoc J 2003;168:1245-51.

22. Wang TH, Wei KC, Hsiung CA, Maloney SA, Eidex RB, Posey DL,
et al. Optimizing severe acute respiratory syndrome response strate-
gies. Am J Public Health 2007;97:598-100.