



ASIA PACIFIC CENTER FOR
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Should negative pressure isolation rooms be used for COVID-19 patients?

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This rapid review summarizes the available evidence on the efficacy and safety of negative pressure isolation rooms for patients with COVID-19 in preventing cross-transmission to other patients and healthcare workers. This may change as new evidence emerges.

KEY FINDINGS

There is no direct evidence on the use of negative pressure isolation rooms (NPIRs) for COVID-19 patients in preventing nosocomial transmission to healthcare workers (HCWs) and other patients. Limited indirect evidence suggests that negative pressure isolation rooms may prevent nosocomial SARS among HCWs and other patients.

- Negative pressure air may prevent nosocomial spread of airborne pathogens (droplet nuclei <5 um diameter) by avoiding the accidental release of pathogens into a larger space and open facility, thereby protecting healthcare workers and patients in a hospital setting.
- There is no direct evidence found for COVID-19.
- Indirect studies on SARS coronavirus (during the outbreak in 2003) were from six observational studies suggesting that NPIRs bundled with other infection prevention and control measures minimize nosocomial SARS infection among HCWs and other patients.
- Current guidelines on COVID-19 management recommend the use of NPIRs for patients undergoing aerosol generating procedures.

RESULTS

There were no studies found on SARS-CoV-2 on the use of negative pressure isolation rooms (NPIRs) in preventing nosocomial transmission to healthcare workers (HCWs) and other patients.

However, indirect evidence on SARS coronavirus was available. Six observational studies were included in this review: one was a cohort study, two both epidemiologic and descriptive containment studies, and three only descriptive containment studies. Four studies were done in Taiwan, one in Thailand, and one in Hong Kong.

In a prospective cohort study, an integrated infection control strategy was tested in minimizing nosocomial SARS infection among HCWs in a military hospital (study hospital) as compared to other hospitals (comparison hospitals) [1]. This strategy included triaging patients using barrier, zones of risk, and extensive installation of alcohol dispensers for glove-on hand rubbing. The study hospital newly built a “negative-pressure-like” environment (non-standard NPIR) while the comparison hospitals had the standard NPIR beds. The study suggests that an integrated infection control strategy (in a hospital with “negative-pressure-like” environment) may lower the number of HCWs developing SARS (0.03 vs. 0.13 cases/bed, $p = 0.03$).

Liu et al. conducted an epidemiologic study and descriptive containment study of nosocomial transmission of SARS in a medical center in Kaohsiung, Taiwan [2]. All patients who were potentially exposed to a SARS patient in the medical center were contacted and monitored. HCWs (both SARS survivors and asymptomatic) were tested for serum SARS coronavirus IgG by ELISA. On day 21 since the admission of the first patient, probable and suspected SARS patients were admitted in standard NPIRs and simple isolation rooms, respectively. A total of 55 cases of SARS were identified: 52 probable SARS and 3 suspected SARS. Among these, 16 were hospitalized patients and 16 medical personnel. A resident doctor died; 12 out of the 15 medical personnel who survived SARS were serologically positive. All 115 asymptomatic HCWs were serologically negative. Moreover, no HCW was infected in whom SARS had been diagnosed. Nosocomial transmission in the medical center terminated 22 days after the admission of the first patient.

Twu et al. conducted an epidemiologic study and descriptive containment study with SARS control measures in Taiwan [3]. The study described the first 23 cases of SARS in Taiwan who were all admitted in NPIRs. It also described the SARS control measures implemented in Taiwan including NPIRs and active surveillance of exposed HCWs and contacts of patients. SARS cases were identified. In the study, one physician tested positive for SARS coronavirus. The physician was closely exposed to a SARS patient admitted in a NPIR. The physician wore PPEs except for goggles during the exposure. No cases of SARS were reported for 525 HCWs, 210 work colleagues, 54 family and friend, and 31 public health staff who were exposed to the first 20 patients.

In one descriptive containment study, one HCW (a nurse) tested positive for SARS after exposure to SARS patients managed in NPIRs bundled with other infection control measures [4]. On the other hand, no HCW developed SARS after exposure to SARS patients managed in NPIRs bundled with other infection control measures in two other descriptive studies [5-6].

Guidelines by the US CDC, the WHO, Surviving Sepsis Campaign experts, and Wuhan Experts, recommend the use of NPIRs for COVID-19 patients undergoing aerosol-generating procedures [7-10].

CONCLUSION

There is no direct evidence on the use of negative pressure isolation rooms (NPIRs) for COVID-19 patients in preventing nosocomial transmission to healthcare workers (HCWs) and other patients. Limited indirect evidence suggests that negative pressure isolation rooms may prevent nosocomial SARS among HCWs and other patients. Current guidelines recommend the use of NPIRs for patients undergoing aerosol-generating procedures.

Declaration of Conflict of Interest

JT is a medical manager at Merck (Philippines).

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