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## Original Article

# Nurse odor perception in various Japanese hospital settings



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## ABSTRACT

Because unpleasant hospital odors affect the nursing environment, we investigated nurses' perceptions of the odors of various hospital settings: hospital rooms, nurse stations, and human waste disposal rooms to discard the urine, stools and diapers. A questionnaire based on the Japanese Ministry of the Environment's guidelines on odor index regulation was used to assess nurses' perceptions of odor intensity, comfort, tolerability, and description in the aforementioned settings. Questionnaires were distributed to nursing department directors at three Japanese hospitals, who then disseminated the questionnaires to nursing staff. Of the 1,151 questionnaires distributed, 496 nurses participated. Human waste disposal rooms had greater odor intensity and were perceived as more uncomfortable than the other settings. Unpleasant odors in disposal rooms, hospital rooms, and nurse stations were rated as slightly intolerable in comparison. Hospital and disposal rooms were mainly described as having a "pungent odor such as of urine and stool." In contrast, nurse stations were described as having other unpleasant odors, such as chemical, human-body-related, or sewage-like odors. Given that nurses spend much of their time in hospital rooms and nurse stations, odor management in these two settings would likely improve nurses' working conditions at hospitals. Improving odors at nurse stations is feasible. Such improvements could have indirect effects on nurse turnover and burnout.

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## 1. Introduction

Odors affect health depending on their description and strength. Sometimes, an odor can be comfortable, while at

other times it can be uncomfortable and influence people's health status (e.g., cause a migraine) [1]. People can experience numerous unpleasant odors in hospital environments depending on the medical conditions of nearby patients,

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such as odors of urine, stools, wound drainage, and cancer [2], as well as chemical odors (e.g., medicine and cleaning supplies). One condition for an optimal hospital physical environment would be unpleasant odor reduction.

Odors affect the performance of creative cognitive tasks. Indoor air quality is a vital element of workers' health [3]. In past studies, researchers found in general that nurses' negative perceptions of their physical work environments (e.g., hospital architectural or interior designs) had no effect on their job satisfaction [4]. In contrast, there was a relationship between some aspects of physical environments and medication errors; one such aspect was perceived air quality. In other words, to reduce medication errors, good air quality is important [5]. Poor quality indoor air in office environments reduces office workers' health, causing problems such as eye irritation and fatigue [6]. One study on the association between perceived psychosocial work environment (i.e., whether "work is interesting and stimulating," "there is too much work to do," "there are opportunities to influence working conditions," and "help is received from fellow workers") and perceived indoor air quality found a significant association between environment and occupants' complaints about and symptoms attributed to indoor air quality [7]. Furthermore, substances such as formaldehyde [8] and various volatile organic compounds [9] can affect indoor air quality, thereby causing health problems.

It is logical that high quality indoor air would be even more important in hospital environments. Poor quality air would affect not only nurses and other health care workers' health, but also that of the patients, both directly by causing the aforementioned symptoms and indirectly by increasing medical error risk. There is some evidence for this. Satisfactory air quality was associated with perceptions of decreased health complaints and improved working conditions in an operating room setting [10]. Other studies on indoor air quality in hospitals [11,12] noted that air quality affects hospital worker health, which carries an indirect risk to patients' recovery. In addition, complaints associated with the perceived indoor air quality, such as dry and stuffy air, noise, drafts, and unpleasant odors, appear to be more common in hospitals than in office environments [13].

The effects of odor on emotion were reported by Kadohisa [14], who found evidence from various human and complementary studies in non-human animals that odors evoke emotion. This is in contrast to another study that found an inverse significant relationship between noise level and perceived stress, but a non-significant relationship between odor and perceived stress [15]. Djukic and her colleagues reported indirect influences of perceived physical work environment such as workplace temperature, ventilation, and lighting on job satisfaction. They suggested that health care leaders should consider using optimal physical work environment design to improve nurses' job satisfaction [16]. Given that unpleasant hospital odors affect nursing environment, it is important to investigate nurses' odor perception at hospitals; however, there is currently little research on this topic.

To our knowledge, research on odor perceptions for various hospital settings frequented by nurses has not been performed, with the exception of the Itakura study [17].

Itakura investigated odor perception in hospital rooms, nurse stations, and human waste disposal rooms using a questionnaire based on the guidelines of odor index regulation by the Japanese Ministry of the Environment [18–20], which had items relating to perceptions of odor intensity, comfort, tolerability, and description. We examined nurses' odor perception in hospital settings. When we surveyed the literature on odors in hospital setting, we collected many proceedings in Japanese, which could not be cited as valid literature. Furthermore, there were no original papers using the odor category scale for general hospitals or written in English. There are normally multi-bed (4) rooms in Japanese general hospitals. We have routinely heard from nurses that issues related to odor have occurred. These questionnaires were distributed to nurses at three large Japanese hospitals and comparisons were made between the settings. The present study examined the causes of daily perceptions of odor by nurses.

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## 2. Methods

### 2.1. Participants

We selected three general hospitals of 500 to 1000 beds, similar building ages (about 30 years old), and hospital facility standards (hospital room volumes) which the authors had visited in Hokkaido, Japan. The hospital facility standards in Japan [21] are predetermined to be 6.4 m<sup>2</sup> or more area per patient in general settings. The height of the ceiling should be at least 2.1 m [22]. Furthermore, multi-bed rooms (4) are common in general hospitals in Japan, obviously in addition to private rooms [21]. Nurses were the target population. They were recruited by contacting the nursing directors requesting their cooperation in the survey both verbally and via signed documents. These documents included: 1) a request for survey cooperation for the facility administrators and nurse managers; 2) a request for survey cooperation for the nurses; 3) survey instructions; and 4) the questionnaire. We did not restrict nurse selection by position or employment condition (e.g., full-time, part-time). The exclusion criteria were working as an outpatient nurse or in operating rooms, central material rooms, or nursing management.

### 2.2. Procedure

After obtaining consent from the nursing directors of the three selected hospitals, we mailed the survey documents to each nursing department. A total of 1151 questionnaires and pre-paid, self-addressed envelopes were mailed to nurses.

The nursing managers were given instructions to distribute the survey instructions, questionnaires, and pre-paid return envelopes to every nurse in each hospital ward. Each participant returned the completed questionnaire by mail using the pre-paid envelopes. Consent was implied by voluntarily returning the questionnaire. The survey period was from November 2013 to December 2014.

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