



## A SECONDARY DATA ANALYSIS OF AGREEMENT OF NEW AND CONVENTIONAL N95 FIT TESTING PROTOCOLS AMONG CHINESE HEALTHCARE WORKERS: KAPPA STATISTICS

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### Abstract

**Background:** Tight-fitting half-facepiece N95 respirators are specialty masks made to suit the face and effectively and safely filter airborne particles. Mandatory N95 fit testing was applied to ensure sustainable occupational safety.

Prior to 2019, an eight-step procedure was used for worldwide N95 fit testing (OSHA 29CFR 1910.134). The Occupational Safety and Health Administration (OSHA) released a condensed, four-step N95 fit testing protocol in 2019. Compared with the conventional protocols, the new one has a shorter completion time (7:15 mins vs 2:29 mins) and includes only essential exercises (Table 1).

OSHA has stated that these new and conventional protocols are equivalent. However, there hasn't been much empirical data to back up this idea of agreement. Prompt remedial action is required to close this scientific and practical gap.

**Objectives:** The purpose of this cross-sectional observational study was to assess, using both new and conventional fit testing protocols, the agreement of the fit testing results of three distinct designed respirators evaluated (pass vs. fail) among Chinese healthcare personnel.

**Methodology:** Using the kappa statistics (i.e., a measure of agreement), a secondary data of 2,907 paired fit testing results (by new and conventional protocols) of three respirators (n=1,006 for NASK-M0011; n=939 for 3M-1870+; n=962 for 3M-1860) were analyzed (Suen et al., 2025). The inclusion and exclusion criteria, measurements, and selected respirator models (i.e., cup-shaped, horizontal flat-fold design and vertical flat-fold with ear loop design) can be found elsewhere (Suen et al., 2025). A value of 0.75 or more means substantial agreement in medical discipline.

**Result(s):** The kappa agreement between the new and conventional protocols was not sufficiently high, which ranged from 0.530 to 0.697 ( $p < 0.001$ ). For determining pass and fail cases, the new 4-step approach seemed to be more stringent than the conventional one in terms of sensitivity and specificity.

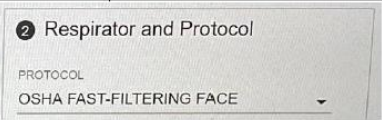
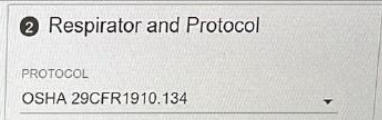
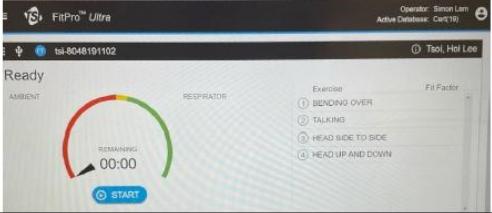
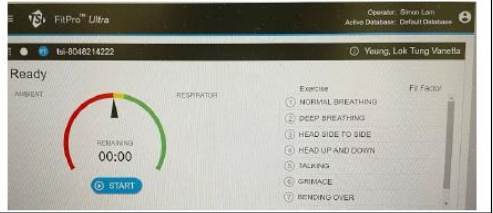
**Conclusion:** The empirical evidence indicated the new and conventional protocols were not interchangeable, which posed implication that a new protocol should be adopted to enhance infection prevention and control. This outcome can serve as a useful standard for fit testing procedures.

**Keywords:** Fit testing, N95 Respirator, Occupational Health, Kappa Statistics

**Reference:**

Suen, L. K. P., Kwok, W. H., Yu, I. T. S., So, S. N. Y., Cheung, K., Lee, P. H., ... & Lam, S. C. (2025). Assessment of the psychometric properties of the mask usability scale: A measure of the perceived usability of N95 respirators among healthcare students and staff. *Journal of Advanced Nursing*, 81(8), 4613-4626. <https://doi.org/10.1111/jan.16590>

**Table 1. Comparison between a new 4-step protocol and conventional 8-step protocol.**

N95 fit testing		Time (sec)	4-step protocol	Time (sec)	8-step protocol
					
1	Approval code		OSHA Fast-filtering face		OSHA 29CFR 1910.134
2	<b>Exercises</b>	--		--	
	Normal breathing			60	Yes
	Deep breathing			60	Yes
	Head side to side	30	Yes	60	Yes
	Head up and down	30	Yes	60	Yes
	Talking	30	Yes	60	Yes
	Grimace			15	Yes
	Bending over	50	Yes	60	Yes
	Normal breathing			60	Yes
3	Total fit test time		2:29 mins		7:15 mins
4	Safety		Same		
Sample of screen captured					



# EFFECTIVENESS OF BODY SENSOR TECHNOLOGY IN PREVENTING PRESSURE INJURIES AMONG HOSPITALISED PATIENTS: A SYSTEMATIC REVIEW

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## Abstract

**Background:** Pressure injuries (PIs) remain a major source of morbidity and cost in hospitalized patients. Conventional prevention strategies, such as scheduled repositioning, are often inconsistently applied. Body sensor technologies, including wearable devices and continuous bedside pressure mapping (CBPM), provide real-time monitoring and feedback that may enhance prevention.

**Objectives:** This systematic review evaluated the effectiveness of body sensor technologies in preventing PIs among hospitalized patients.

**Methodology:** Following PRISMA 2020 guidelines, PubMed, CINAHL, Scopus and EBSCO databases were searched using predefined keywords related to sensors, monitoring systems, and pressure injuries (table 1). Eligible studies included randomized controlled trials (RCTs), observational studies, and pre-/post-implementation evaluations in hospitalized populations. Of those 4030 identified articles, eight studies met inclusion criteria and were appraised by two individual reviewers (i.e., MKL and KSTT) for design, interventions, outcomes, and validity according to the JBI (Joanna Briggs Institute) Critical Appraisal Tools.

**Result(s):** Evidence from five experimental studies (four RCTs and one quasi-experimental clinical comparison) demonstrated mixed outcomes. Behrendt et al. (2014) reported an 81% reduction in hospital-acquired PIs with CBPM, while Pickham et al. (2018) found a 67% reduction using wearable turn-alert sensors. Raizman et al. (2018) observed a 93% reduction with sub-epidermal moisture scanning. Two retrospective burn ICU studies (Eter et al., 2021; Yesantharao et al., 2021) showed decreased incidence, reduced severity, and cost savings. Conversely, Gunningberg et al. (2017) and Ho et al. (2023) found no significant differences, suggesting possible staff awareness effects. One observational study by Sakai et al. (2009) confirmed feasibility of continuous monitoring but with outcome mismatch.

**Discussion:** Body sensor technologies show promise in reducing PI incidence, improving compliance, and lowering costs. However, inconsistent findings highlight the influence of patient population, staff engagement, and workflow integration. Larger multicenter RCTs are needed to confirm effectiveness and guide implementation.

**Keywords:** Body Sensor Technology, Pressure Injuries, bedsores, pressure ulcers, pressure sore



Table 1. Searching terms and combinations

Terms related to sensors and monitoring systems	( sensors OR wearable device OR sensor mattress OR sensing OR monitors OR monitoring system OR monitoring devices OR visual reminder OR turning reminder OR pressure sensing mattress or smart mattress OR continuous pressure monitoring or continuous pressure sensing)
Terms related to the action words	AND (prevent OR control OR relieve)
Terms related to the key outcomes	AND (pressure injury OR pressure sore OR pressure ulcer OR bed sore)



## TREND ON TECHNOLOGY-ENHANCED INTERVENTIONS ON COGNITIVE TRAINING FOR OLDER ADULTS: LITERATURE REVIEW

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### Abstract

**Background:** The ageing population further increases the prevalence of Cognitive impairment (CI) and its impact on instrumental activities of daily living (IADL) and quality of life (QoL). Traditional interventions for maintaining cognitive function (including memory, executive function and attention) rely on paper-based tasks and professionally led sessions. Emerging technologies offer more engaging, personalized, and multimodal interventions with promising outcomes, while the applicability in Hong Kong remains underexplored.

**Objectives:** This literature review summarises international evidence on the application of technology in elderly cognitive training interventions and evaluates their relevance for implementation in Hong Kong.

**Methodology:** This study was a literature review that adopted the PRISMA guideline to structure the searching strategy and ensure the transparency and integrity of the review findings. Relevant empirical studies were searched from electronic bibliographic databases, including PubMed, Embase, and Wiley. The search strategy focused on advanced technology-based cognitive training interventions among cognitively healthy older adults and those with mild cognitive impairment.

**Result(s):** 14 studies were selected after screening, of which 50% focused on cognitively healthy elderly. Both global and local interventions were designed at different scales (e.g., individual, professionally led) and employed diverse technologies (e.g., virtual reality, gamification, and artificial intelligence). Significant improvements were reported, primarily in memory and executive function, whereas few local studies examined IADL or QoL outcomes.

**Discussion:** Technology-based cognitive interventions show substantial potential to enhance reach and scalability for older adults. However, implementing such interventions in Hong Kong must account for the elderly's cultural context, technology literacy, and acceptance. These findings inform the design of practical interventions to prevent or delay CI in the local ageing population. Additionally, future studies can focus on the elderly's IADLs and QoL to provide more comprehensive evidence of the effectiveness of technology-based cognitive interventions among the elderly.

**Keywords:** Cognitive training, Elderly, Technology-enhanced



# ANTHROPOMETRIC PREDICTORS OF N95 RESPIRATOR FIT AMONG CHINESE HEALTHCARE WORKERS: A SECONDARY DATA ANALYSIS

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## Abstract

**Background:** Although N95 respirators are widely used to reduce the risk of airborne infectious transmission in clinical occupational health settings, ensuring optimal fit remains a considerable challenge across various populations. Evidence suggests that approximately 50% of half-mask respirator leaks occur at the nasal region, 30% at the chin, and 10% at the cheeks, underscoring the need to examine the relationship between specific facial areas and respirator fit. Nevertheless, empirical research addressing these associations remains scarce. This is a secondary data analysis that may limit causal inference, but still provides valuable insights on infection prevention and control.

**Objectives:** This study aimed to examine the association between specific anthropometric parameters and N95 respirator fit test pass rates, and to identify facial morphological characteristics that predict successful respirator fit among Chinese healthcare professionals.

**Methodology:** This study utilized a secondary data analysis methodology, drawing upon pre-existing datasets that comprised both anthropometric measurements and N95 respirator fit test outcomes as reported in Suen et al. (2025). The study design was cross-sectional and observational in nature, focusing on the examination of associations between specified variables without the implementation of experimental interventions. The dataset encompassed demographic information such as gender, height, and weight, in addition to facial dimensions—including face width, face length, and menton-sellion (MN-S) distance—as well as comprehensive records of quantitative fit test results for at least one model of N95 respirator. The inclusion and exclusion criteria, details of all variables, measurement methods and respirator models (i.e., cup-shaped, horizontal flat-fold design and vertical flat-fold with ear loop design) were available on the published article (Suen et al., 2025). The descriptive statistics and multilevel logistic regression was used to identify the salient facial features associated with the pass rate of N95 fit testing.

**Result(s):** The dataset contained a sample of 1,029 fit testing results, which was composed of 75.2% healthcare students and 24.8% frontline healthcare staff, and 74.3% female. Fit testing passing rates of three commonly used respirators ranged from 77.9% to 91.4%. The means of height, weight, face width, face length and MN-S were 163.28 cm (SD 8.04), 58.21 kg (SD 12.12), 13.25 cm (SD 0.82), 10.95 cm (SD 0.86) and 7.08 cm (SD 0.62), respectively. Among three logistic regression analyses, only for the



horizontal flat-fold respirator, MN-S (Odd ratio = 0.53,  $p = 0.003$ ) was associated with the pass rate significantly ( $\chi^2(6, N=939) = 16.07, p = 0.013$ ) with the control of sex, height and weight. Specifically, each additional centimeter in MN-S was associated with a 0.53-fold decrease in the odds of failing the fit test for this respirator type.

**Conclusion:** The preliminary results suggested that, among Chinese individuals, most facial anthropometric measurements are not significantly correlated with the likelihood of passing the N95 fit test. However, an exception was observed for the MN-S distance when using the horizontal flat-fold respirator model. These new findings posed implication for healthcare workers, occupational health policymakers, or respirator manufacturers on how to enhance better fit testing protocols, guide respirator selection and training, and design Chinese-specific N95 respirators. Future studies may consider testing across different ethnic groups by the integration of 3D facial scanning for accurate measurement.

**Keywords:** Respirator, Fit testing, Facial anthropometrics, Health care worker, Nursing students, Registered nurses

**Reference:**

Suen, L. K. P., Kwok, W. H., Yu, I. T. S., So, S. N. Y., Cheung, K., Lee, P. H., ... & Lam, S. C. (2025). Assessment of the psychometric properties of the mask usability scale: a measure of the perceived usability of N95 respirators among healthcare students and staff. *Journal of Advanced Nursing*, 81(8), 4613-4626. <https://doi.org/10.1111/jan.16590>



## DEVELOPMENT OF NURSING PRACTICE GUIDELINES FOR PEDIATRIC PATIENTS WITH FEBRILE CONVULSION

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### Abstract

**Background** Febrile convulsions are common in children aged 6 months to 5 years. Children who experience febrile convulsions have a chance of recurrence and developing epilepsy. The incidence of recurrent febrile convulsion was higher than safety standards of Phra Pokklao Hospital, Chanthaburi. Development of nursing practice guidelines may reduce the incidence of recurrence febrile convulsion.

**Objective:** This research aimed to develop nursing practice guidelines for pediatric patients with febrile convulsion.

**Methodology:** Samples were pediatric nurses and pediatric patients with febrile convulsion admitted at Phra Pokklao Hospital, Chanthaburi Province. Ten steps of the National Health and Medical Council (NHMC, 1999) in Australia are used as the conceptual framework for developing nursing practice guidelines. Data were analyzed using descriptive statistics.

**Results:** The nursing practice guideline for pediatric patients with febrile convulsion consists of three phases; Initial admission, During admission, and Planning discharge.

**Discussion:** The nursing practice guidelines for pediatric febrile convulsion have the potential to be applied when caring for children with febrile convulsion. Nursing interventions with safety readiness and equipment preparedness, health assessment and lumbar puncture preparation, tepid sponge and drug administration, first - aids, health education and discharge planning are important and challenging for nursing practice.

**Keywords:** Nursing Practice Guideline, Pediatric Patient, Febrile Convulsion