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CASE REPORT

BACKGROUND TO THE REPORT

Hand hygiene is one of the most basic infection control practices in healthcare settings as poor hand hygiene can allow infectious microorganisms to be spread between healthcare workers and patients. Hand hygiene is one of the key measures in preventing healthcare associated infections, and the World Health Organization (2009) suggests that health care organizations make proper facilities, training, monitoring and institutional support available to ensure compliance.

This report will explore the hypothetical district health board of Glynafonshire whose district nurses did not consistently practice a hand washing policy. The policy included nurses using proper handwashing procedures and washing their hands before entering and after leaving a patient's property. Nurses had been trained and were to be evaluated on both paper and practical in their understanding and competency. However, some nurses were seen doing improper procedures, rushing in the procedure or not washing their hands at the correct time. Eight patients went on to develop a serious infection, one of whom died. Importantly, information given to the Health Board showed, staffing shortages and extra numbers of patients had led to longer working days, back-to-back shifts and staff being responsible for around two times as many patients as normal.

The fact that nurses had previously demonstrated competence suggests that the incident cannot simply be attributed to a lack of knowledge. Instead, cognitive factors which are related to the handling of the difficult tasks when stressed might have been the cause of failures in applying the knowledge that is already available. Hence the current report will use the Working Memory Model (WMM) (Baddeley & Hitch, 1974) to argue that the higher workload may have impacted nurses' capacity to sustain their attention and accurately perform handwashing. The report will then explore the implications of knowing about working memory for preventative procedures, the ethical issues raised by such interventions and the constraints of the model in the case.

THE WORKING MEMORY MODEL

Baddeley and Hitch (1974) first theorized the existence of the Working Memory Model as an alternative to the single short-term memory system. Instead of considering short-term memory as a single storage system, the model considers working memory to be a limited-capacity system that is used for temporary storage and manipulation of information in complex cognitive tasks. The original model comprised three components. Central executive, phonological loop and the visuospatial sketch pad. Baddeley and Hitch (2000) later added a fourth component, the episodic buffer.

The central executive is of special significance for the present case. It's involved in attentional control, which involves distributing attention, organizing information and shifting from one thing to another (Justyna Harasimeczuk, 2024). Although the least understood part of the model, suggests that the central executive consists of functions such as focusing, dividing and switching attention. The phonological loop temporarily stores and rehearses verbal and auditory information. A nurse, for example, can repeat the steps of hand washing verbally in her mind. The phonological loop is limited in capacity. It is so that the temporary representation can be disrupted by interfering verbal information. The visuospatial sketchpad holds and manipulates visual and spatial information for a short period of time. If it's handwashing, it may be learning the image of the movements needed to wash various parts of the hands. This last concept, episodic buffer, is that information from various sources is combined into a temporary multimodal representation. It can connect information from the phonological loop, visuospatial sketchpad and long-term memory (Angelopoulou & Drigas, 2021).

The model is thus useful in explaining why, in situations when nurses are required to do a procedure under stress, they can have knowledge but struggle with it. Working memory processes only a limited amount of information. Completing tasks and information may compete and interfere with the maintenance and manipulation of task-relevant information. Baddeley and Hitch provided pioneering evidence for the involvement of working memory in complex processes like reasoning and comprehension and limited capacities of storage and processing.

One of the implications is that just because you know a procedure doesn't mean you will be able to perform it. A nurse might have mastered the proper hand washing technique during training and have been able to perform it satisfactorily on an examination, but then not consistently use it when working memory demands are high.

HOW DOES THE THEORY RELATE TO THE CASE STUDY

The Working Memory Model can offer cognitive insight to the nurses' failures by taking into account the connection between the increase in workload, divided attention and limited cognitive resources (Yuan et al., 2026).

Staffing issues were noted in the case as nurses working double shifts and twice as many patients as normal, as a result of staff shortages. This type of circumstances will likely result in many concurrent cognitive challenges. In addition to planning the next visit, a district nurse may want to recall patient data, next dosage, symptoms, appointments, documentation, safety concerns or communicating with a patient. Hand hygiene is then one of the competing needs among others (Abdulmgid Mrwy Alenezi et al., 2024).

If the WMM believes the central executive is responsible for distributing attention among these competing activities, this raises the question of how it would do so. The nurse's mind may be occupied with the previous patient, the next appointment and if the nurse has enough time to do their jobs, less attention might be given to the handwashing procedure. This may account for the fact that sometimes the procedure was rushed or its completion was not ensured (Alshagrawi & Alhodaithy, 2024).

Verbal information can also clutter up the phonological loop. Directives from patients may be needed to be retained and instructions from colleagues or supervisors may be needed and information relevant to subsequent visits may need to be remembered (Goedegebure et al., 2025). While the hand washing steps may be remembered before, the memory for the sequence might still demand working memory resources, especially if the nurse is distracted.

Likewise, the visuospatial sketchpad might be involved in recalling the order and spatial orientation involved in a complete handwashing procedure (Jayasekara et al., 2025). When the nurse has to concentrate on the physical procedure as well as other environmental or occupational demands, only part of the procedure may be completed or the nurse may not be able to keep track of whether or not all areas of the hands have been cleaned.

The description of nurses "rushing" is of special significance in the case. Rushing doesn't necessarily prove that nurses didn't comprehend the policy. Rather, it could be because the nurses were focusing on multiple tasks due to the need for time.

There is substantial evidence from research on hand hygiene that workload and cognitive demands are important. For instance, Zhang et al. (2019) examined the hand hygiene adherence policy compliance of nurses working in four hospital wards, and concluded that there was an independent, negative association between hand hygiene adherence and nursing workload. Further, a prospective observational study carried out during an entire year showed that hand hygiene compliance rates reduce with workload, when measured electronically (Scheithauer et al., 2017).

Other studies have shown an effect of workload. The German study in a hospital setting concluded that workload, such as the number of patients in the ward and the severity of their condition, had an influence on hand disinfection compliance even for the healthcare workers who had professional training (Knoll et al., 2010). This is very applicable to the current scenario as these nurses were competent and experienced, but did not always follow the procedure.

There is also some more recent evidence that suggests a role for cognitive load in adherence to guidelines. In a study of 1005 clinical nurses in 2026, working pressure and extraneous cognitive load and task complexity were linked to guideline adherence. The researchers suggested to minimize unnecessary mental strain and workload of nurses, and to improve their knowledge of clinical guidelines (Liu et al., 2026). This study was explicitly conducted using the Cognitive Load Theory framework and is not conducted using the framework of the Working Memory Model, but it offers supporting evidence for the general statement that cognitive demands do impact nurses' ability to follow established procedures.

The evidence in the case therefore, makes it clear that the problems in this case should not be seen only as a problem of individual negligence. Rather, the relationship between the individual cognition and the organisational conditions ought to be taken into account.

SUGGESTIONS FOR NEW PROCEDURES BASED ON THE THEORY

The knowledge about working memory indicates that the interventions need to decrease the unnecessary cognitive load and need to make the proper procedure easier under stress (Lukianenko, 2025).

The Health Board could provide simple pictorial signage at the entrance and exit to patients' homes, demonstrating the key steps in hand hygiene (Elia et al., 2022). This would minimize the amount of time the nurse needs to spend to get the procedure ready in their mind and give visual cues and would allow the nurse to concentrate on their work. Reminders should be short and to the point so they don't add to a student's cognitive load.

Hand washing is basically a very obvious shift activity and should be performed before and after entering and leaving each patient's property and allotted enough time in a nurse's schedule to ensure it is completed (Alshagrawi & Alhodaithy, 2024). This would take away the effect of time pressure and make sure that hand washing is not considered as an extra chore.

The Health Board should consider staffing levels, patient allocation and shift scheduling to ensure that nurses are not routinely caring for twice their normal amount of patients. This is important especially since expecting nurses to focus more may not solve the issue itself. Lessening the workload would reduce the mental strain on the nurses and more time would be available for infection control (Cerela-Boltunova & Millere, 2025).

Short practical refreshing sessions might make handwashing more familiar to nurses and minimize the need for conscious working-memory processing (van Roekel et al., 2021). Training should also be undertaken in realistic high workload scenarios, allowing nurses to practice correct procedures in high stress scenarios.

Structured observations could be used by the Health Board to monitor hand hygiene and to give regular feedback. Monitoring should concentrate on determining obstacles and improving practice, not targeting individual nurses. This would make nurses more inclined to report workload problems and problems with compliance (Ojanperä et al., 2020).

These procedures should focus on patient safety whilst keeping to a level of equity towards nurses. Monitoring should be open, reasonable and only for information required to enhance health care delivery. It is important that the nurse's failures are not attributed to being over-worked or under staffed. Interventions should also be free of excess mental demands and should help foster a positive and non-punitive safety culture.

EVALUATION AND CRITIQUE OF THEORY

The Working Memory Model (WMM) explains why the nurses might not have implemented handwashing procedures, even after they had demonstrated knowledge and competence in the past. The additional demands on attentional control and the central executive would have been increased workload, back to back shifts and caring for twice the number of patients. This correlation has been reported in recent studies. Chang et al (2021) reported that hand hygiene compliance was found to be lower with an increasing workload. Likewise, Zhang et al. (2025) concluded that the complexity of the tasks and the cognitive load are related to lower adherence to clinical guidelines among nurses.

However, the WMM should not be considered a complete explanation for this instance. The model is mainly cognitive in nature and neglects many factors like fatigue, motivation, time pressure, organisational culture and staffing shortage. The nurses could have been conscious of prioritising patient-care tasks more important than memory retrieval or forgetting. Thus, it is more appropriate to view the case as a dynamic between cognitive and organisational elements (Manulik et al., 2026).

The proposed interventions, like the visual reminders and streamlined procedures are compatible with WMM since they decrease space in working memory for nurses to maintain information. Reminders will not be effective however if there are too much workload. In recent years, research has shown that the workload and working pressure may have a negative impact on clinical procedure adherence (Arvidsson et al., 2025). Thus, workload reduction and adequate time for hand washing should be considered, in addition to cognitive supports.

In general, the WMM is informative and explanatory but is not fully explanatory. It is a way to illustrate that different needs can conflict with attention and procedure and that this is insufficient to explain the behaviour of the nurses. As a result, the theory should be utilized to guide interventions to support and not solely to blame individual nurses. This is significant in an ethical sense, as the case has noted deficiencies in staff numbers and overwork are major contributing factors.

CONCLUSION AND RECOMMENDATIONS

The Glynfaronshire Health Board case shows that, even when the appropriate knowledge and learning is available, care workers have failed to follow the required procedures. Although the nurses passed their written and practical tests, the workload and working hours increased at the same time as the adherence to hand washing was poor after the nurses were faced with a number of responsibilities that were increased and placed on them one after another.

This discrepancy is well-explained in terms of cognition by the Working Memory Model by Baddeley and Hitch. The proposed model is that working memory is limited capacity and that it requires systems for the temporary maintenance of information and attention control. In conditions of increased workload, the central executive system might have to split its attention among several competing tasks, and the phonological loop and visuospatial sketchpad might have to hold onto information relevant to these tasks. Even a procedure that the nurse is very familiar with may be conducted improperly or inconsistently under high cognitive stress (Syeda et al., 2025).

A relationship between workload, time pressure and hand hygiene adherence is supported by research. Research studies have shown that compliance is worse in busy nurses and that cognitive load, busyness and stress can have an impact on adherence (Molina-Mula & Gallo-Estrada, 2020).

The theory suggests that the Health Board should implement brief visual procedural reminders, allow for short pauses to hand-hygiene, provide realistic training, ensure monitoring and implement strategies to minimise increased workload. These interventions should take place within a supportive and safe culture and not involve too much surveillance or blaming individual nurses for the failings of the organisation.

However, the Working Memory Model should not be thought of as a solution in its entirety. The incident can be attributed to a number of possible factors, including cognitive impairment. The best would be a combination of cognitive psychological knowledge and organisational and infection control strategies. Considering the role of staffing shortages and workload, while at the same time providing cognitive support, is likely to offer a more ethical and effective way of preventing future similar incidents.

REFERENCE LIST

- Abdulmgid Mrwy Alenezi, Ganiah Alnasmi T Alenezi, Taleb, I., Fidaa Saleh Alanazi, Qasem, N., Khazin, S., Maali, A., Abdulrahman, F., Asma, A., Ahmed, & Najwa Owaidh Aljohani. (2024). Nursing management of cognitive overload in high-acuity clinical environments. *International Journal of Computational and Experimental Science and Engineering*, 10(4). <https://doi.org/10.22399/ijcesen.4736>
- Alshagrawi, S., & Alhodaithy, N. (2024). Determinants of hand hygiene compliance among healthcare workers in intensive care units: A qualitative study. *BMC Public Health*, 24(1). <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-024-19461-2>
- Angelopoulou, E., & Drigas, A. (2021). Working memory, attention and their relationship: A theoretical overview. *Research, Society and Development*, 10(5), e46410515288. <https://doi.org/10.33448/rsd-v10i5.15288>
- Arvidsson, L., Lindberg, M., & Skytt, B. (2025). Balancing resources and responsibility: Managers' perspectives on promoting infection prevention behaviours in hospital settings. *Leadership in Health Services*, 38(5), 113–127. <https://doi.org/10.1108/lhs-02-2025-0022>
- Baddeley, A. (2003). Working memory and language: An overview. *Journal of Communication Disorders*, 36(3), 189–208. [https://doi.org/10.1016/s0021-9924\(03\)00019-4](https://doi.org/10.1016/s0021-9924(03)00019-4)
- Baddeley, A. D., & Hitch, G. (1974). Working memory. *Psychology of Learning and Motivation*, 8(8), 47–89. [https://doi.org/https://doi.org/10.1016/S0079-7421\(08\)60452-1](https://doi.org/https://doi.org/10.1016/S0079-7421(08)60452-1)
- Baddeley, A. D., & Hitch, G. J. (2000). Development of working memory: Should the pascual-leone and the Baddeley and hitch models be merged? *Journal of Experimental Child Psychology*, 77(2), 128–137. <https://doi.org/10.1006/jecp.2000.2592>
- Cerela-Boltunova, O., & Millere, I. (2025). Exploring the relation between nursing workload and moral distress, burnout, and turnover in Latvian intensive care units: An ecological analysis of parallel data. *International Journal of Environmental Research and Public Health*, 22(9), 1442–1442. <https://doi.org/10.3390/ijerph22091442>
- Chang, N.-C. N., Schweizer, M. L., Reisinger, H. S., Jones, M., Chrischilles, E., Chorazy, M., Huskins, W. C., & Herwaldt, L. (2021). The impact of workload on hand hygiene compliance: Is 100% compliance achievable? *Infection Control & Hospital Epidemiology*, 43(9), 1–3. <https://doi.org/10.1017/ice.2021.179>
- Elia, F., Calzavarini, F., Bianco, P., Vecchiotti, R. G., Macor, A. F., D'Orazio, A., Dragonetti, A., D'Alfonso, A., Belletrutti, L., Floris, M., Bert, F., Crupi, V., & Aprà, F. (2022). A nudge intervention to improve hand hygiene compliance in the hospital. *Internal and Emergency Medicine*, 17(7), 1899–1905. <https://doi.org/10.1007/s11739-022-03024-7>
- Goedegebure, I., Jukema, J. S., Paul, & Martine. (2025). Understanding distributed situational awareness and information exchanges for safe patient care by hospital ward nurses: A focused ethnographic study. *Nursing Inquiry*, 32(2). <https://doi.org/10.1111/nin.70020>
- Jayasekara, M., Senanayake, T., & Karunaratne, N. (2025). Improving hand hygiene compliance among nursing students through visual reminders: A simple intervention research. *Journal of Patient Care and Nursing Practice*, 2(2), 42–46. <https://doi.org/10.33545/30789087.2025.v2.i2.a.20>
- Justyna Harasimczuk. (2024). 50 Years of research on working memory. *Kwartalnik Naukowy Fides et Ratio*, 58(2), 77–84. <https://doi.org/10.34766/fetr.v58i2.1274>
- Knoll, M., Lautenschlaeger, C., & Borneff-Lipp, M. (2010). The impact of workload on hygiene compliance in nursing. *British Journal of Nursing (Mark Allen Publishing)*, 19(16), S18–22. <https://doi.org/10.12968/bjon.2010.19.Sup6.78213>
- Liu, L., Peng, T., Wei, J., Ding, S., & Zhang, S. (2026). Influence factors of guideline adherence based on the cognitive load theory among clinical nurses: A cross-sectional study. *International Journal of Nursing Sciences*, 13(3), 282–289. PubMed Central. <https://doi.org/10.1016/j.ijnss.2026.04.001>
- Lukianenko, N. (2025). Neuroeducation and cognitive load: Theoretical foundations and pedagogical implications in higher education. *The Scientific Notes of the Pedagogical Department*, 95. <https://doi.org/10.26565/2074-8167-2025-56-10>

- Manulik, S., Czapla, M., Vellone, E., Aldossary, H., Juárez-Vela, R., Martínez-Sabater, A., & Uchmanowicz, I. (2026). Determinants of nursing care rationing among nurses employed in surgical and conservative hospital wards. *BMC Nursing*, 25(1). <https://doi.org/10.1186/s12912-026-05079-9>
- Molina-Mula, J., & Gallo-Estrada, J. (2020). Impact of nurse-patient relationship on quality of care and patient autonomy in decision-making. *International Journal of Environmental Research and Public Health*, 17(3), 1–24. <https://doi.org/10.3390/ijerph17030835>
- Ojanperä, H., Kanste, O. I., & Syrjala, H. (2020). Hand-hygiene compliance by hospital staff and incidence of health-care-associated infections, Finland. *Bulletin of the World Health Organization*, 98(7), 475–483. <https://doi.org/10.2471/blt.19.247494>
- Scheithauer, S., Batzer, B., Dangel, M., Passweg, J., & Widmer, A. (2017). Workload even affects hand hygiene in a highly trained and well-staffed setting: A prospective 365/7/24 observational study. *Journal of Hospital Infection*, 97(1), 11–16. <https://doi.org/10.1016/j.jhin.2017.02.013>
- Syeda, Malik, D. M., & Ziauddin. (2025). *The cognitive cost of multitasking in high-stress professions: Implications for mental efficiency, error rates, and long-term cognitive health*. 3(2), 2469–2487. <https://doi.org/10.59075/5khqjn37>
- van Roekel, H., Reinhard, J., & Grimmelikhuijsen, S. (2021). Improving hand hygiene in hospitals: Comparing the effect of a nudge and a boost on protocol compliance. *Behavioural Public Policy*, 6(1), 1–23. <https://doi.org/10.1017/bpp.2021.15>
- World Health Organization. (2009). *WHO guidelines on hand hygiene in health care : First global patient safety challenge clean care is safer care*. World Health Organization. https://iris.who.int/bitstream/handle/10665/44102/9789241597906_eng.pdf?sequence=1
- Yuan, Z., Xie, W., Wang, J., Li, X., Zeng, L., & Yang, F. (2026). Construction and evaluation of a predictive model for high mental workload risk among clinical nurses: A cross-sectional study. *Frontiers in Public Health*, 14. <https://doi.org/10.3389/fpubh.2026.1724229>
- Zhang, S., Kong, X., Lamb, K. V., & Wu, Y. (2019). High nursing workload is a main associated factor of poor hand hygiene adherence in Beijing, China: An observational study. *International Journal of Nursing Practice*, 25(2), e12720. <https://doi.org/10.1111/ijn.12720>
- Zhang, S., Liu, L., Ding, S., Peng, T., Wang, J., & Wu, Y. (2025). Mediator effects of cognitive load on the relationship between task complexity and guideline adherence among clinical nurses: A cross-sectional survey of nurses in China. *Journal of Research in Nursing*, 30(5–6), 479–490. <https://doi.org/10.1177/17449871251329197>