

AI Acknowledgement

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CASE REPORT

BACKGROUND TO THE REPORT

This report is based upon a hypothetical case study involving district nurses employed by Glynafonshire Health Board and examines adherence to the organisations mandatory handwashing policy. The Health Board enforces strict guidelines requiring all district nurses to perform correct handwashing procedures both before and after entering a patient's home, with the aim of preventing the transmission of infection. These procedures and techniques are formally taught during nurse training, with competency assessed through both written and practical examinations, all of which nurses involved had successfully completed. Despite this, concerns were raised when evidence emerged that some nurses were not consistently complying with the policy, including the use of incorrect techniques, rushed practices, and omissions of handwashing at critical points. As a consequence of these failures, eight patients contracted a serious infection, one of which resulted in a fatality, prompting a formal investigation by the Health Board.

To better understand how such errors occurred despite appropriate training and assessment, the following section will apply the Attentional Capacity Theory (ACT; Kahneman, 1973) to explore the role of workload, pressure, and attentional resources in routine healthcare practice.

THE ATTENTIONAL CAPACITY THEORY

ACT, commonly referred to as the Limited Capacity Model of Attention (Kahneman, 1973), proposes that attention consists of a finite pool of cognitive resources that must be flexibly allocated across concurrent tasks (Wickens, 2002). According to this model, performance decrements occur when task demands exceed available attentional capacity, resulting in slowed responses, reduced monitoring, or increased error rates (Kahneman, 1973). Kahneman (1973) emphasised that the amount of mental effort required varies according to task difficulty and situation pressures, and that individuals prioritise tasks based on perceived importance and urgency (Bruya & Tang, 2018). In circumstances characterised by high workloads, stress, or fatigue, attentional resources may be overstretched, leading to reduced monitoring and increased errors in routine or well-practiced activities (Hockey, 1997).

Empirical support for this model is provided by extensive dual-task research demonstrating competition for shared cognitive resources. Classic laboratory studies have shown that performing two tasks simultaneously leads to systematic performance decline, supporting the notion of a central, limited-capacity attentional system (Pashler, 1984; Wickens, 2014). Applied research has replicated these effects in real-world contexts, most notably in driving studies where secondary tasks significantly impair reaction times (Patten et al., 2004; Strayer et al., 2003) which demonstrates performance decrements when attentional resources are divided, supporting the notion of a limited, shared pool of cognitive resources. More recent neurobehavioral evidence further supports the models' proposed mechanisms: studies using behavioural and neuroimaging methods indicate the presence of a central attentional bottleneck, whereby concurrent tasks cannot be processed in parallel without interference (Dux et al., 2006; Tombu et al., 2011).

Further theoretical refinement was offered by Norman and Bobrow (1975), who distinguished between resource-limited and data-limited processing, arguing that many performance failures arise

from insufficient attentional resources rather than deficits in knowledge or skill. Later applied models developed by Wickens (1984, 2002) and Hockey (1997) extended these principles to high-stake environments, demonstrating that sustained workload and stress narrow attentional focus and increase the likelihood of error in safety-critical domains, such as healthcare.

Collectively, this body of research substantiates ACT (Kahneman, 1973) by demonstrating how limited cognitive resources constrain performance under concurrent task demands.

HOW DOES THE THEORY RELATE TO THE CASE STUDY

The ACT (Kahneman, 1973) provides a useful framework for explaining how the events in the case study occurred despite nurses having received appropriate training and demonstrating prior competence in correct handwashing procedures. According to the theory, attention is a limited cognitive resource that must be allocated across competing tasks, with performance deteriorating when overall demands exceed available capacity (Wickens, 2021). Within the case study, district nurses were operating under conditions characterised by high workloads, time pressure, staff shortages, and fatigue, all of which are known to place significant demands on attentional resources (Pi et al, 2025; Surendran et al., 2024). As a result, attentional capacity was likely prioritised towards immediate clinical responsibilities, which as patient assessment and treatment, rather than towards routine infection-control behaviours.

Under conditions of attentional overload, individuals tend to rely more heavily on automatic processing, with reduced conscious monitoring of well-practised tasks (Oberauer, 2019). While handwashing is a routine and well-learned procedure for qualified nurses, the ACT suggests that even automatic behaviours require a minimal level of attention to ensure accuracy (Kahneman, 1973). When attentional resources are depleted, routine tasks may be rushed, partially completed or omitted entirely. This provides an explanation for the observed

failures in correct handwashing techniques and timing described in the case study.

Furthermore, research indicates that sustained workload, stress, and fatigue can lead to attentional narrowing, whereby focus is directed towards tasks perceived as most urgent, while preventive or background safety behaviours receive less attention (Hockey, 1997). In this context, infection-control procedures such as handwashing may have been deprioritised in favour of managing patient schedules and clinical demands. Importantly, this interpretation aligns with Norman and Bobrow's (1975) distinction between resource-limited and data-limited performance, suggesting that the nurses' errors were due to insufficient attentional resources rather than a lack of knowledge or motivation.

Overall, ACT explains the failures observed in the case study as predictable outcomes of cognitive overload within a demanding healthcare environment. The theory highlights how system level pressures can undermine safe practice, shifting the focus away from individual blame and towards the management of workload and attentional demands in order to reduce the likelihood of future errors.

EXAMPLES IN THE LITERATURE OF THIS LINK TO THE CASE STUDY

Research by Reason (1990) provides further support for ACT by distinguishing between skill-based slips and knowledge-based mistakes. Reason (1990) argued that under conditions of attentional overload, fatigue, or distraction, well-learned behaviours are especially vulnerable to execution errors, even when individuals correctly intend to perform them. This is directly relevant to the case study, as handwashing is a skill-based, automatic behaviour that is susceptible to lapses when attention is divided (Chang et al., 2021).

Similarly, Parasuraman and Davies (1984) demonstrated that sustained workload and vigilance demand reduce attentional capacity over time, leading to declines in monitoring performance and increased error rates. Their research showed that prolonged mental effort results in attentional depletion, particularly affecting tasks that require continuous but low-salience monitoring, such as adherence to procedural safety rules. In the context of the case study, sustained workload and vigilance demands may have depleted nurses' attentional resources, increasing the risk of errors in routine but essential practices such as correct handwashing.

In healthcare specific context, Westbrook et al. (2010) examined the effect of interruptions and cognitive load on clinical performance, finding that increased task demands significantly raised the likelihood of procedural errors. Although not explicitly framed within ACT, their findings align with Kahneman's (1973) model by showing that competing attentional demands impair task execution even among trained professionals. Frequent interruptions and competing task demand during busy patient visits may have increased cognitive load, making nurses more susceptible to procedural errors.

Furthermore, Warm et al. (2008) provided evidence that stress and mental workload lead to attentional narrowing, reducing the ability to monitor peripheral or preventive tasks. This supports

the explanation that nurses in the case study may have prioritised immediate patient care over infection-control behaviours when attentional resources were strained.

Collectively, these studies reinforce the application of ACT (Kahneman, 1973) to the case study by demonstrating that attentional overload, fatigue, and sustained workload reliably increase the likelihood of errors in routine, safety-critical behaviours. This body of evidence supports the interpretation that the observed failures in handwashing were predictable consequences of cognitive limitations rather than individual negligence or lack of training.

SUGGESTIONS FOR NEW PROCEDURES BASED ON THE THEORY

ACT states that performance declines as task demand surpass available capacity because attention is a limited cognitive resource (Kahneman, 1973). Within the case study, failures in handwashing adherence are therefore best understood as consequences of attentional overload rather than insufficient training or motivation. Preventing similar failing requires interventions that either reduce overall cognitive demands or provide additional support for attentional control, in line with well-established human factors principles (Reason, 2000).

One important strategy would be to reduce the workload and time pressure, as high task demand is consistently associated with attentional depletion and increased error rates in healthcare (Wu et al., 2026). Empirical studies have shown that hand hygiene compliance declines significantly as workload increases, even among experienced and well-trained staff (Chang et al., 2021; Pittet et al., 2000). From an attentional capacity perspective, excessive workload consumes cognitive resources needed for monitoring routine actions, making lapses more likely. Organisational changes such as more realistic scheduling of community visits, limits on consecutive high-demand appointments, and improving staffing levels could therefore reduce attentional strain and support consistent infection-control behaviour.

A second evidence-based approach involves the use of external cognitive supports, such as prompts, cues and checklists. ACT predicts that offloading some monitoring demands onto the environment reduces reliance on limited internal resources (Kahneman, 1973). Checklists and visual prompts have been shown to reduce errors in a range of healthcare contexts by compensating for attentional limitations rather than attempting to eliminate them (Haynes et al., 2009; Reason, 2000). In the context of district nursing, strategically placed hand hygiene reminders or procedural prompts

at key transition points (entering and existing patients' homes) could help re-orient attention toward safety-critical behaviours when cognitive resources are stretched.

Reducing interruptions and task switching also represents an important preventive strategy. Divided attention and frequent interruptions are known to impair procedural performance and increase the likelihood of slips and lapses, particularly in routine tasks that rely on automatic processing (Reason, 1990). In healthcare settings, increased interruption frequency has been associated with higher rates of procedural error (Westbrook et al., 2010). Applying these findings to the present case, minimising non-urgent interruptions during patient transmissions, or structuring workflows to protect time for infection-control procedures, may preserve attentional resources for essential safety tasks such as handwashing.

Finally, fatigue management is critical for maintaining attentional capacity over time. Recent evidence shows that occupational fatigue among nurses is strongly linked to reduced cognitive control, impaired attention, and increased error vulnerability, particularly under sustained workload pressure (Pi et al., 2025). ACT suggests that as fatigue accumulates, fewer resources are available to support monitoring and error detection (Kahneman; 1973). Interventions such as structured rest breaks, limits on extended shifts, and improved recovery between working days may therefore reduce attentional depletion and improve adherence to routine procedures.

In summary, the application of ACT (Kahneman, 1973) highlights that preventing future failures requires system-level interventions that account for the inherent limits of human cognition. By reducing workload and interruptions, supporting attention through environmental cues, and managing fatigue, healthcare organisations can design working conditions that better align with cognitive capacity and reduce the likelihood of errors in routine but safety-critical behaviours.

EVALUATION AND CRITIQUE OF THEORY

ACT (Kahneman, 1973) has been widely used to explain performance degradation under high workload by conceptualising attention as a finite cognitive resource. Its strength lies in offering a parsimonious explanation for why errors occur even among trained professionals when task demands exceed cognitive capacity (Eysenck & Derakshan, 2011). However, despite its influence, the theory has been subject to substantial critique regarding its explanatory precision and applicability to complex, real-world settings such as healthcare.

A central critique of the ACT (Kahneman, 1973) is its lack of specificity regarding underlying cognitive mechanisms. While the theory predicts that performance will decline under overload, it does not clearly distinguish between different types of attentional failures or error forms (Eysenck & Darakshan, 2011). Critics argue that ACT is largely descriptive, explaining when performance deteriorates but not how particular errors emerge (Navon & Gopher, 1979). Empirical work in human error research suggests that different error types arise from distinct cognitive mechanisms, which are not fully differentiated within ACT (Reason, 1990). As a result, the theory may oversimplify the nuanced ways in which attentional failure manifests in complex tasks.

Another limitation concerns the theory's implicit assumption of a single, general attentional resource. Subsequent research has challenged this view, proposing instead that attention is made up of multiple, partially independent resources. Wickens's (2002) Multiple Resource Theory demonstrates that tasks compete for attention differently depending on modality, processing stage, and response type. This has strong empirical support (Wickens, 2002; 2008) and suggests that ACT may overestimate interference between certain tasks while underestimating others. In the context of the case study, this limitation implies that while handwashing failed, other nursing tasks may have remained intact.

Fatigue research further complicates ACT's explanatory power. While ACT assumes that fatigue reduces available attentional capacity, it does not explicitly model the time-based or cumulative nature of fatigue. Empirical evidence shows that prolonged workload produces progressive declines in sustained attention and executive monitoring, particularly during routine or low-salience tasks (Warm et al., 2008). Recent nursing research confirms that occupational fatigue impairs vigilance and error detection rather than global task performance, indicating more selective cognitive breakdowns than ACT predicts (Pi et al., 2025).

When applied to the case study, ACT (Kahneman, 1973) provides a convincing account of how errors occurred, particularly in explaining lapses in routine handwashing, despite adequate training and competence. The theory aligns well with evidence showing that workload, time pressure, staff shortages, interruptions, and fatigue increase attentional demands and error risk in healthcare settings (Chang et al., 2022; Surendran et al., 2024; Westbrook et al., 2010). Handwashing, as a well-practiced and skill-based behaviour, is particularly vulnerable to attentional lapses when monitoring resources are depleted, a prediction strongly consistent with ACT and supported by human error literature (Reason, 1990).

However, ACT alone does not fully account for why unsafe conditions persisted or why organisational safeguards failed to prevent error. Studies on hand hygiene consistently demonstrate that compliance is influenced not only by cognitive load but also by organisational culture, leadership priorities, and systematic constraints (Emasmus et al., 2010; Pittet et al., 2004). While ACT explains the cognitive vulnerability of nurses under pressure, it does not address latent organisations failures, such as staffing policies or workload expectations, that created sustained attentional overload. System-based models, such as Reason's (2000) Swiss Cheese Model, offer a broader explanatory framework by integrating individual cognitive limitations with organisation and managerial factors.

Furthermore, ACT assumes that individuals are motivated to perform correctly but constrained by limited resources (Kahneman, 1973). This assumption may not fully capture the

phenomenon of behavioural adaptation under chronic overload, where repeated exposure to high demands leads staff to prioritise speed and task completion over safety behaviours, Research on normalisation of deviance indicates that when overload becomes the norm, safety procedures may be informally deprioritised, even without conscious intent (Dekker, 2016). ACT explains momentary lapses but offers less insight into how repeated attentional strain can reshape behavioural norms over time.

In summary, ACT offers a strong and empirically supported explanation for the cognitive mechanisms underlying failures in the case study, particularly lapses in routine handwashing under high workload and fatigue. Nevertheless, its explanatory scope is limited by its broad resource conceptualisation and its relative neglect of organisational and motivational influences. While ACT is appropriate for explaining how attentional overload led to errors, a more complete understanding of the incident emerges when it is integrated with complementary human factors and system-based theories.

CONCLUSION AND RECOMMENDATION

In conclusion, this report has examined the Glynafonshire Health Board case study through the lens of ACT (Kahneman, 1973) to explain how failures in mandatory handwashing occurred despite adequate training and competence. Drawing on cognitive theory and empirical healthcare literature, it has been argued that high workload, time pressure, staff shortages, interruptions, and occupational fatigue placed excessive demands on nurses limited attentional resources (Chang et al., 2022; Pi et al, 2025; Surendran et al., 2024), increasing the likelihood of slips and lapses in routine but safety-critical behaviours. While ACT provides a strong explanation for the cognitive mechanisms underlying these errors, its limitations in accounting for organisational influences were also acknowledged, highlighting the value of integrated system-based perspectives (Reason, 2000). Importantly, the report demonstrated that preventing similar failings requires shifting away from individual blame towards evidence-based, system-level interventions that reduce cognitive demands and support attentional control, such as workload management, fatigue mitigation, environmental cues, and interruption reduction. Overall, applying ACT to this case underscores both the vulnerability of human performance under pressure and the critical role of organisation design in safeguarding patient safety.

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