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Infection Prevention and Control

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October 2025

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Gloves off!: Environmental and financial impacts of an educational intervention to improve hand hygiene. A quality improvement study

Infection, Disease & Health

August 2025

Non-sterile gloves are often used inappropriately in clinical care, with associated poorer hand hygiene, and financial and environmental waste.This before and after study assessed the impact of an educational intervention on non-sterile glove use, hand hygiene compliance, knowledge and attitudes, and environmental and financial metrics. Participants were clinical staff working in two acute surgical wards of an adult tertiary referral hospital from May 2023 to March 2024. The intervention, 'Gloves Off!', was a multi-modal education intervention delivered during July–August 2023. The main outcome measures were: glove purchase numbers and associated carbon footprint, waste to landfill, financial cost; hand hygiene compliance and unnecessary glove use; staff hand hygiene knowledge and attitudes. Measures were taken at baseline, post-intervention, and seven-month follow-up.

Glove purchase numbers fell by an average of 6.9 gloves per occupied bed day after the intervention. The estimated monthly reduction of 13,020 gloves for two wards equates to reductions in carbon footprint of 443kgCO_2e, waste 44.8 kg and cost AUD$651. Hand hygiene compliance improved from 59 % (151/254) at baseline to 83 % (125/150) at follow-up and unnecessary use glove use fell from 60 % (152/252) at baseline to 23 % (13/56) at follow-up. Survey results showed that after education, staff demonstrated significant improvements in aspects of hand hygiene and glove use knowledge.

A ‘Gloves Off!’ intervention was successful in improving glove use behaviour and staff hand hygiene, knowledge and attitudes as measured by observational audits, staff surveys, and glove purchase data. Significant cost, waste and carbon footprint reductions were achieved.

Read the article online at https://doi.org/10.1016/j.idh.2025.07.003

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1. **Learning With Fun: The Effect of Flipped Learning and Escape Room Method on Nursing Students' Infection Control Knowledge and Learning Skills.**

Authors: Acun A. and Yildirim, A.

Publication Date: 2025

Journal: International Journal of Nursing Practice 31(5), pp. e70067

Abstract: BACKGROUND: Flipped learning and escape room (gamification) are among the innovative teaching strategies frequently used in interactive education methods today, focusing on problem-solving learning. These methods are important in promoting achievement by taking responsibility for learning.
OBJECTIVE(S): The study aimed to evaluate the effect of flipped learning and the escape room method on nursing students' knowledge and skill learning about infection control.
MATERIALS AND METHODS: The study was a randomized controlled trial with open-label pretest-posttest. The research was conducted with 76 students in the experimental and control groups. In the study, while the experimental group students were taught using the flipped learning method, which is an effective way of learning outside the classroom, their learning was reinforced with gamification using the escape room method. These teaching methods also encouraged students to take responsibility for their own learning. Data were collected by administering the 'Characteristics Form for the Student Group', the 'Knowledge Test on Infection Control Measures' and the 'Self-Directed Learning Skills Scale'.
RESULT(S): The post-test and follow-up test knowledge scores of the experimental group are statistically significantly higher than those of the control group ($p < 0.001$), and the difference has a high effect ($d = 4.15$). When the total score and all sub-dimensions of the Self-Directed Learning Skills Scale were analysed, a significant increase was found between the pretest and posttest scores of the experimental group compared with the control group ($p = 0.003$; $p = 0.023$; $p = 0.023$; $p = 0.001$; $p = 0.049$; $p = 0.033$; $p < 0.05$).
CONCLUSION(S): The study showed that flipped learning and escape room methods significantly improved nursing students' knowledge and skills related to infection control. Students' self-learning ability, taking responsibility and teamwork skills were strengthened.
TRIAL REGISTRATION: ClinicalTrials.gov identifier: NCT06670469.

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2. **Gender dynamics in hand hygiene practices: A survey in a specialized dermatological Scientific Institute for Research, Hospitalization and Health Care**

Authors: Altamura, Gerardo;Laurenti, Patrizia;Heidar Alizadeh, Aurora;Raspolini, Gian Marco;Facchiano, Antonio;Virgili, Rosamaria;Nurchis, Mario Cesare;Raponi, Matteo;Cavarra, Marco;Panebianco, Annarita and Damiani, Gianfranco

Publication Date: 2025

Journal: Annali Di Igiene : Medicina Preventiva E Di Comunita 37(6), pp. 691–704

Abstract: Background: A high adherence to hand hygiene procedures is regarded as cost-effective for preventing healthcare-associated infections. How important it is perceived by healthcare workers may determine the level of adherence to recommendations. This survey aimed at investigating perceptions, practices, and gender dynamics surrounding hand hygiene among healthcare professionals.; Study Design: This study followed a cross-sectional design, involving a questionnaire administered only once to each participant.; Methods: The study was set in a dermatological Scientific Institute for Research, Hospitalization and Healthcare (SIRHHC) in Italy. An internet-based survey was made available to every SIRHHC's healthcare worker for two months of 2024. Surveyed population consisted of healthcare professionals involved in patient care within the SIRHHC, including physicians, nurses, and other healthcare staff. The questionnaire was based on the World Health Organization Hand Hygiene Self-Assessment Framework 2010 and involved both open-ended questions and Likert-scale items. Descriptive statistics and qualitative analyses were used to identify themes and quotes related to hand hygiene. To examine the relationship between the percentage of inpatients who will suffer from a healthcare-associated infection and predictor variables, a generalized linear model was fit. Tests were conducted to assess the robustness of results.; Results: Answers from 172 respondents, predominantly nurses (66.86%) and female workers (69.6%), were analyzed. Training emerged as a critical determinant of awareness, with participants reporting higher perceived compliance (86.98%) than general compliance rates (77.52%). However, workload pressures and perceived effort required for adherence (rated 5.70/7) were identified as barriers to consistent practice. Institutional support for hand hygiene, reflected in training initiatives and leadership prioritization (rated 3.87/4), was strong, yet patient involvement remained underutilized (rated 4.55/7). While gender differences in beliefs about healthcare-associated infections (HCAIs) were not statistically significant, the high representation of women highlighted their pivotal role in infection prevention and the potential for leadership in hygiene promotion.; Conclusions: This study provides actionable insights into improving hand hygiene practices and fostering a culture of safety within healthcare settings.

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3. **Hero Program: A data-driven reward system to improve hand hygiene**

Authors: Barzegar Khanghah, Ali;Chavoshian, Shaghayegh;Janidarmian, Majid;Rustin, Simon;Fernie, Geoff and Roshan Fekr, Atena

Publication Date: 2025

Journal: American Journal of Infection Control 53(10), pp. 1064–1069

Abstract: Healthcare-associated infections compromise patient outcomes and pose a burden on healthcare systems worldwide. Despite widespread awareness of the critical role of Hand Hygiene (HH) in preventing healthcare-associated infections, compliance among healthcare workers remains suboptimal. This study evaluates a reward program called the Hero Program which is designed to incentivize and sustain HH practices through positive reinforcement. The program used data from an electronic HH prompting system that has been installed in an inpatient unit in Toronto Rehabilitation Institute - University Health Network for 3 years. A

scoring algorithm was implemented to weigh individual HH compliance rates, considering workload and rewarding consistency. Daily winners were selected based on their scores and received gift card rewards. The analysis of data from 61 caregivers and more than 566,000 records for approximately 2.5 years indicates that the Hero Program led to an 11.45% increase in HH compliance after 120 days of implementation. This is a promising finding, suggesting that the program was effective in promoting behavior change early on. Compliance rates continued to improve over time, reaching 94% 1 year later. This sustained improvement suggests that the program had a long-lasting positive impact on HH practices in the unit. • The Hero Program increased hand hygiene (HH) compliance by 11.45% in 120 days. • Compliance reached 94% after a year, with reduced variability. • Novel scoring weighted compliance by workload and recent wins for fairness. • Analysis of 566,000 records confirmed sustained behavior change. • First study to integrate gamification with electronic monitoring for HH adherence.

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4. **Improving hand hygiene in hospitals: A comparative study using body-worn cameras and direct observation**

Authors: Belman, D.;Ben-Chetrit, E.;Belman, C. and Levin, P. D.

Publication Date: 2025

Journal: American Journal of Infection Control 53(10), pp. 1055–1057

Abstract: Hand hygiene (HH) prevents infections, but traditional monitoring is limited by office hours and the Hawthorne effect. We used body-worn cameras in ICU to compare video with direct observation. After ethics approval, staff wore a GoPro™ on the upper abdomen during patient care. A trained observer simultaneously documented opportunities and performance. A blinded researcher analyzed the video. Both methods were compared on opportunities, compliance, performance, and duration. Seventeen paired video and observer data sets captured 166 HH opportunities and 147 events. Of these, 118/147 (80%) were in response to a HH opportunity and 29/147 not (20%). Including HH performance-related to events, overall HH compliance was 71%. Both methods identified 80% of opportunities. Video detected 11.5% of missed opportunities, while the observer identified 8.5% missed by video. Mean duration was comparable (11.3±9.2 sec vs. 12.0±9.8 sec, p=0.55). Body-worn cameras effectively identified HH opportunities, performance, and duration, capturing events missed by observers ~20% of the time. However, video analysis had flaws, revealing missed events upon review. Observer data, long considered the gold-standard, showed only 80% accuracy. Body-worn cameras are a feasible tool for HH monitoring, but are labor-intensive. Automating video analysis could enhance feasibility for routine use. • Hand hygiene feedback is mostly during office hours; compliance may drop at night. • Video systems may improve compliance and reduce HAI but require stronger validation. • Body-worn cameras proved feasible for HH monitoring, enabling after-hours observation. • Automation and privacy safeguards are essential before it can be scalable.

5. **Behavioural factors influencing hand hygiene practices across domestic, institutional and public community settings: a systematic review and qualitative meta-synthesis.**

Authors: Caruso B.A.;Snyder J.S.;O'Brien L.A.;LaFon E.;Files K.;Shoaib D.M.;Prasad S.K.;Rogers H.K.;Cumming O.;Esteves Mills J.;Gordon B.;Wolfe M.K. and Freeman, M. C.

Publication Date: 2025

Journal: BMJ Global Health 10(7) (pagination), pp. Article Number: e018927. Date of Publication: 16 Se 2025

Abstract: Introduction This systematic review sought to understand barriers and enablers to hand hygiene in community settings. Methods Eligible studies addressed hand hygiene in a community setting, included a qualitative component, and were published in English between 1 January 1980 and 29 March 2023. Studies were excluded if in healthcare settings or were animal research. We searched PubMed, Web of Science, EMBASE, CINAHL, Global Health, Cochrane Library, Global Index Medicus, Scopus, Public Affairs Information Service Index, WHO Institutional Repository for Information Sharing, UN Digital Library and World Bank eLibrary, manually searched relevant systematic reviews' reference lists, and consulted experts. We used MaxQDA software to code papers, using the COM-B (Capability, Opportunity, Motivation and Behaviour) framework to classify barriers and enablers. We used thematic analysis to describe each COM-B subtheme identified, GRADE-CERQual to assess confidence in evidence for thematic findings and the Mixed Method Appraisal Tool (MMAT) to assess risk of study bias. Results 80 studies were included; most took place in Africa (31; 39%), South-East Asia (31; 39%) and domestic settings (54; 68%). The mean MMAT score was 4.86 (good quality). Barriers and/or enablers were reported across all COM-B constructs and subconstructs. The most reported barriers aligned with Physical Opportunity (eg, soap availability), Reflective Motivation (eg, hand hygiene not prioritised) and Automatic Motivation (eg, no habit). In contrast, the most reported enablers aligned with Automatic Motivation (ie, habit) and Reflective Motivation (ie, perception of health risk). Conclusion Findings confirm that a lack of necessary resources for hand hygiene hinders practice, even when people are motivated. Results may explain why hand hygiene increases when there are acute health risks (eg, COVID-19), but decreases when risks are perceived to fade. The qualitative methodology used among the studies may have revealed a broader array of barriers and enablers than what might have been found by quantitative, researcher-driven studies, but representativeness may be limited. Evidence was also limited on alcohol-based hand rubs. Findings can inform the design of future hand hygiene initiatives.

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6. **Snapshot audit of adherence to hospital infection prevention and control policy pertaining to the monitoring of IV cannulae. A quality improvement project.**

Authors: Dawson E.;Jatania J.;Walls M.;Fish T. and Wharrier, J.

Publication Date: 2025

Journal: British Journal of Surgery.Conference: Annual Congress of the Association of Surgeons of Great Britain and Ireland.Edinburgh United Kingdom 112(Supplement 13) (pp

xiii104), pp. Date of Publication: 01 Aug 2025

Abstract: Aims: A quality improvement project was undertaken in a small district general hospital to investigate whether Infection and prevention control policies pertaining to IV cannulation were being followed. This guidance stated that cannulae should be: correctly dressed and labelled, documented in the electronic record and assessed twice daily to ensure there are no signs of thrombophlebitis.
Method(s): On 15th May 2024 every inpatient in the hospital with a cannula was examined to assess whether the aforementioned criteria had been met along with the duration of time the cannula had been in and examination findings.
Result(s): It was found that 38%(n=86) of inpatients had a peripheral cannula sited. Of these, over 30% were documented in the notes and only 10 cannulae had a date label attached. The time since insertion of the cannula ranged from 24 to 240 hours. There were 26 cannulae that had spoiled dressings in situ and evidence of thrombophlebitis in 18 cannulae, which, once identified were promptly removed by staff.
Conclusion(s): From this audit it was concluded that there should be more awareness of the basic standards set out by the trust on IV cannulation to help prevent pathogenic infiltration into the cannulae. These results have been presented at the hospital's grand round and a poster detailing these recommendations has been created to highlight the areas of concern and hopefully improve clinical practice. The audit will undergo a second cycle to investigate whether these interventions have improved things.

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7. **Digital feedback to improve adherence to hand hygiene: A longitudinal study on the effects of an electronic monitoring system**

Authors: Granqvist, Karin;Ahlstrom, Linda;Karlsson, Jon;Lytsy, Birgitta and Erichsen, Annette

Publication Date: 2025

Journal: American Journal of Infection Control 53(10), pp. 1049–1054

Abstract: This study investigated the impact of digital feedback from an electronic monitoring system (EMS) to health care workers (HCWs) at both the group and individual levels on the adherence to hand hygiene (HH). An EMS was installed in a surgical ward at a tertiary hospital and adherence rates among HCWs (n = 15) were measured from October 2018 to December 2019. After an initial baseline period, digital feedback was given to the HCWs first at the group level (2 months), and then at both the group and individual levels (2 months). Adherence rates were then measured over an additional follow-up period of 9 months. Digital feedback for 9 months at both the individual and group levels significantly increased adherence to HH compared with the baseline (37.9% vs 52.5%). The mean increase in adherence rates was 14.5%. Feedback over a shorter period (2 months) had the same effect at neither the group level nor the individual level. Follow-up long-term studies are crucial to evaluate the effect of digital feedback. As research on innovations monitoring HH adherence is still in its infancy, this study contributes with valuable findings into the impact of digital feedback. • Hand hygiene was monitored electronically in a hospital ward. • Digital feedback to users was introduced either at the group or individual level. • Adherence rates were shown as stars with undisclosed values. • In the follow-up phase, adherence was displayed as actual percentage values. • A significant improvement in adherence was observed over the 9-month follow-up period.

8. **Fostering sustainable infection prevention behaviors through organizational culture and psychological resources in healthcare settings**

Authors: Kim, Sun Ok and Sim, Moon Suk

Publication Date: 2025

Journal: Medicine 104(40), pp. e45013

Abstract: Competing Interests: The authors have no funding and conflicts of interest to disclose.; Infection prevention is a critical aspect of healthcare, directly impacting patient safety and outcomes. Previous studies have investigated various individual factors influencing infection control behaviors; however, limited research has examined the combined impact of organizational culture, environmental factors, and self-efficacy. This study aims to explore the multidimensional determinants of infection prevention behaviors using the information-motivation-behavioral skills framework. A cross-sectional study was conducted among 407 nurses from 2 mid-sized hospitals in South Korea. Data were collected using a structured survey assessing infection control organizational culture, prevention environment, knowledge, attitudes, job stress, self-efficacy, and prevention behaviors. Structural equation modeling was applied to analyze direct and indirect relationships between variables. Infection control organizational culture significantly influenced both infection control attitudes and prevention behaviors, while the prevention environment had a significant effect on job stress. Infection control self-efficacy emerged as a critical mediator, significantly enhancing prevention behaviors. Contrary to expectations, job stress did not directly undermine infection prevention behaviors but indirectly influenced them through self-efficacy. Knowledge had limited direct effects but influenced prevention behaviors through attitudes and self-efficacy. The findings underscore the importance of fostering a supportive organizational culture and prevention environment to enhance infection control practices. By integrating the Information-Motivation-Behavioral Skills Model framework, this study highlights the interconnected pathways influencing infection prevention behaviors. These insights can guide the development of targeted interventions and policies to improve healthcare safety and outcomes. (Copyright © 2025 the Author(s). Published by Wolters Kluwer Health, Inc.)

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9. **The impact of infection control activities conducted by urologists through multidisciplinary rounds on patients with indwelling urinary catheters in general wards on catheter-associated urinary tract infections.**

Authors: Koh D.;Bae S.;Chung H.;Kim Y.J.;Chang Y.S.;Han C.H. and Jeong, H. J.

Publication Date: 2025

Journal: European Urology Conference: EAU25 - 40th Annual EAU Congress. Madrid Spain, pp. Date of Publication: 01 Mar 2025

Abstract: Introduction & Objectives: The purpose of this study is to investigate the impact of proactive interventions on catheter-associated urinary tract infections and catheter management in patients with indwelling catheters in general wards.
Material(s) and Method(s): From April to September 2023, multidisciplinary rounds and

subsequent bundle inspection activities were conducted ten times for all inpatients with indwelling catheters. Prior training was provided to all ward personnel, and preliminary inspection rounds were conducted in December 2022 and January 2023 to identify vulnerable wards or patient groups. During the pilot rounding, approximately 33% to 40% of patients had indwelling catheters across various wards without distinction by department or characteristics, thus all hospital wards except for pediatric, hospice, and obstetric wards were included in the rounds. From March to September 2023, multidisciplinary rounds were conducted ten times, with bundle monitoring and on-site feedback provided six times. The inspections evaluated and provided feedback on catheter bag and catheter positioning, hand hygiene before and after patient contact, and maintenance of a closed system. The urologist assessed the indications for catheterization, recommending removal or treatment as appropriate.
Result(s): During the period, there were 600 patients with indwelling catheters. Initially, feedback related to catheter issues was given for 29.2% of the patients during rounds, but this rate decreased to a minimum of 4.6%. While the appropriate positioning of urine bags, catheter patency rates, and hand hygiene after contact exceeded the target level of 90%, catheter fixation and hand hygiene before contact remained below 90%, necessitating ongoing education. The average duration of catheterization for all patients decreased by 1.22 days, and the incidence of bacterial isolation was reduced by approximately 26%. Out of the 13 patients who experienced persistent urinary retention or failed self-voiding after catheter removal, 11 received continued collaborative care and voiding management through outpatient urology services.
Conclusion(s): The urology-led multidisciplinary rounds for inpatients with indwelling catheters resulted in significant improvements in catheter-related guidelines and practices. Additionally, collaborating with various clinical departments on catheter removal responsibilities helped minimize the duration of catheterization, thereby reducing infection rates. This approach is expected to be beneficial and should be implemented in many clinical settings.

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10. **Improving Hand Hygiene Skills Using Virtual Reality: Quasi-Experimental Study**

Authors: Mira, José;González, Mery;Villalba, Carolina;Guerra, Laura;Ramirez-Moya, Yesid;Hernández, Jazmín;Moya, Olga;Pineda, Luis and Pérez-Esteve, Clara

Publication Date: 2025

Journal: Journal of Medical Internet Research 27, pp. e78882

Abstract: Background: Hand hygiene is a critical strategy for preventing health care-associated infections (HAIs) and reducing health care costs. However, adherence remains low, particularly among health care assistants (HCAs) and informal caregivers (ICs), who often lack formal training. Virtual reality (VR) delivers standardized, immersive practice with active learning and real-time feedback. It has shown favorable effects on skill execution and acceptability in training paramedics and caregivers. To our knowledge, VR has not been systematically applied to train World Health Organization (WHO)-aligned hand hygiene techniques. Given its portability and suitability for brief, repeatable drills, VR is a plausible solution to upskill HCAs and ICs in both hospital and home-care settings.; Objective: This study aims to assess the immediate training effectiveness and implementation feasibility of a brief VR-based hand hygiene program for HCAs and ICs in Colombia. We quantified pre-post

changes in correct execution (primary outcome), timing, errors, and knowledge. Success was defined a priori as achieving ≥75% correct execution after training, consistent with adherence levels associated with HAI reductions when embedded in WHO-aligned bundles in prior studies.; Methods: In this quasi-experimental, one-group pretest-posttest study, 215 participants (94 HCAs, 121 ICs) completed up to three 15-minute VR training sessions with real-time feedback on hand hygiene technique following the WHO recommendations for hand hygiene. Data were collected at baseline (pre) and immediately after the VR intervention (post). Variables assessed included correct execution (primary; binary), error counts, timing adequacy, knowledge assessment, and acceptability.; Results: Correct hand hygiene performance increased from 26.6% to 97.9% among HCAs (95% CI 92.6-99.4; P<.001) and from 9.9% to 95.9% among ICs (95% CI 90.7-98.2; P<.001), with paired odds ratios of 34.5 (95% CI 8.46-140.72) and 21.8 (95% CI 8.90-53.43), respectively. Wide intervals were driven by the very small number who performed worse after training. Timing adequacy improved significantly in both groups, reaching 46.6 (SD 6.7) and 48 (SD 6.6) seconds, respectively (P<.001). Common errors, such as insufficient fingertip coverage and incomplete thumb cleaning, were reduced to near 0 (P<.001). Knowledge scores also improved significantly in both groups, and VR training was rated as "very useful" or "extremely useful" for skill acquisition.; Conclusions: VR training significantly improved hand hygiene technique and knowledge. The high acceptance rates observed suggest that these technologies can effectively enhance infection prevention skills in undertrained populations, supporting broader adoption in health care education. Because this brief, portable, and highly acceptable intervention can be embedded in routine onboarding, refresher microdrills, and caregiver education-including home care and resource-constrained settings-VR is well-suited for scale-up. When implemented within WHO-aligned multimodal bundles and with adherence sustained above pragmatic thresholds, this approach may contribute to downstream reductions in HAIs. Definitive confirmation will require a controlled effectiveness trial.; Trial Registration: ClinicalTrials.gov NCT07005544; https://clinicaltrials.gov/study/NCT07005544. (©José Mira, Mery González, Carolina Villalba, Laura Guerra, Yesid Ramirez-Moya, Jazmín Hernández, Olga Moya, Luis Pineda, Clara Pérez-Esteve. Originally published in the Journal of Medical Internet Research (https://www.jmir.org), 07.10.2025.)

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11. **Promoting equitable access to infection prevention for people with different vulnerabilities: a scoping review**

Authors: Moreal, Chiara;Dobrowolska, Beata;Ozdoba, Patrycja;Szara, Marta;Velikonja, Nevenka Kregar;Šimec, Mateja;Laznik, Gorazd;Krsnik, Sabina;Roig, Anna Escofet;Esparza, Mireia;Solà-Pola, Maria Montserrat;Özsaban, Aysel;Bayram, Aysun;Palese, Alvisa and Chiappinotto, Stefania

Publication Date: 2025

Journal: BMC Nursing 24(1), pp. 1236

Abstract: Competing Interests: Declarations. Ethics approval and consent to participate: Not applicable. Consent for publication: Not applicable. Competing interests: The authors declare no competing interests.; Background: Educational health interventions play a crucial role in the prevention of respiratory infections, particularly among people with vulnerabilities, who bear a disproportionate burden, which can lead to severe complications such as increased morbidity

and mortality. Tailored educational approaches, including digital interventions, are essential to engage and empower these groups, promote self-care behaviors, and reduce health inequities. Despite their significance, evidence on educational interventions, particularly those leveraging digital platforms, has yet to be systematically mapped. To identify and analyze existing educational interventions designed to foster self-care behaviors and prevent respiratory infections among people with vulnerabilities in community settings was the intent of this study.; Methods: The PRISMA-ScR checklist was followed to conduct this scoping review. Systematic searches were performed in PubMed, CINAHL, Cochrane, and Scopus, supplemented by grey literature and reference screening. Studies involving educational interventions for people with vulnerabilities in community settings were included, with no publication date restrictions. The review protocol was registered in the Open Science Framework on February 21, 2024. Data extracted were narratively synthesized, focusing on interventions characteristics, different populations included, and outcomes.; Results: Twelve studies were included, reporting in-person education, tailored materials, e-health, telehealth, digital and computer-based educational interventions. Older adults, children, individuals with chronic conditions, and groups with socioeconomic vulnerabilities were involved. Interventions have triggered significant improvements in knowledge, attitudes, and preventive behaviors. Digital approaches enhanced outreach and engagement but revealed barriers such as technological disparities due to limited digital literacy among people with vulnerabilities. In-person and culturally tailored interventions proved effective in promoting behavior change, particularly when aligned with community needs.; Conclusions: Tailored, community-based and hybrid approaches that combine face-to-face and digital components are recommended to close knowledge and behavioral gaps regarding preventive measures against respiratory infections in people with different vulnerabilities. However, there are challenges such as inequality in digital access and variability in intervention outcomes that suggest hybrid models and culturally sensitive approaches. Further research is needed to assess the long-term impact of these strategies on reducing respiratory infections and improving health equity.; Clinical Trial Number: Not applicable. (© 2025. The Author(s).)

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12. **Impact of infection prevention and control quality improvements in haemodialysis facilities: a scoping review.**

Authors: Ngema S.A.;Bale T.L.A. and Ramukumba, T. S.

Publication Date: 2025

Journal: BMC Nephrology 26(1) (pagination), pp. Article Number: 527. Date of Publication: 01 Dec 2025

Abstract: Background: Healthcare-associated infections (HAIs) pose significant risks to patients undergoing haemodialysis, necessitating effective infection prevention and control (IPC) strategies. This scoping review aims to summarise and analyse the existing literature on quality improvement (QI) interventions that enhance adherence to infection prevention and control measures in dialysis settings.
Method(s): A comprehensive literature search was conducted across PubMed, Cochrane Library, MEDLINE, EMBASE and Google Scholar databases, identifying 10 relevant studies published between January 2013 and October 2024. The review was conducted according to an established methodology for scoping studies and followed guidelines. Data extraction and

analysis were performed to evaluate the effectiveness and applicability of various quality improvement interventions.
Result(s): 31 267 records with 10 studies eligible for final review. Post-intervention evaluation varied considerably across studies. The analysis revealed that diverse QI strategies significantly improved adherence to infection prevention protocols, including staff education, protocol standardisation, and multimodal interventions. However, the evaluation of outcomes differed across different contexts. Common patterns identified included the effectiveness of training programs in enhancing staff knowledge and the importance of leadership support in sustaining IPC practices. Additionally, some studies revealed a significant decrease in infection rates following the interventions, highlighting the effectiveness of structured educational efforts in enhancing patient safety and infection control in clinical settings.
Conclusion(s): This review provides valuable insights for healthcare professionals and policymakers to reduce HAIs in dialysis environments, thereby improving patient outcomes and promoting safety within healthcare systems. Future research should focus on implementing and evaluating integrated QI models tailored to local contexts in diverse healthcare settings. Clinical trial: Not applicable.

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13. **Synergistic and off-target effects of bacteriocins in a simplified human intestinal microbiome: implications for Clostridioides difficile infection control**

Authors: Ríos Colombo, Natalia,S.;Paul Ross, R. and Hill, Colin

Publication Date: 2025

Journal: Gut Microbes 17(1), pp. 2451081

Abstract: Clostridioides difficile is a major cause of nosocomial diarrhea. As current antibiotic treatment failures and recurrence of infections are highly frequent, alternative strategies are needed for the treatment of this disease. This study explores the use of bacteriocins, specifically lacticin 3147 and pediocin PA-1, which have reported inhibitory activity against C. difficile . We engineered Lactococcus lactis strains to produce these bacteriocins individually or in combination, aiming to enhance their activity against C. difficile . Our results show that lacticin 3147 and pediocin PA-1 display synergy, resulting in higher anti- C. difficile activity. We then evaluated the effects of these L. lactis strains in a Simplified Human Intestinal Microbiome (SIHUMI-C) model, a bacterial consortium of eight diverse human gut species that includes C. difficile . After introducing the bacteriocin-producing L. lactis strains into SIHUMI-C, samples were collected over 24 hours, and the genome copies of each species were assessed using qPCR. Contrary to expectations, the combined bacteriocins increased C. difficile levels in the consortium despite showing synergy against C. difficile in agar-based screening. This can be rationally explained by antagonistic inter-species interactions within SIHUMI-C, providing new insights into how broad-spectrum antimicrobials might fail to control targeted species in complex gut microbial communities. These findings highlight the need to mitigate off-target effects in complex gut microbiomes when developing bacteriocin-based therapies with potential clinical implications for infectious disease treatment.

14. **Assessment tool for surgical hand washing skills: a scale development study.**

Authors: Sengor K.;Alptekin H.M.;Kara O.;Gorucu R.;Ayoglu T. and Akyuz, N.

Publication Date: 2025

Journal: BMC Surgery 25(1), pp. 443

Abstract: PURPOSE: Valid and reliable assessment tools are essential for evaluating surgical hand washing skills, which play a crucial role in preventing surgical site infections. This study aimed to develop and validate an objective assessment tool for evaluating surgical hand washing competency among nursing students. DESIGN: Methodological validation study. METHOD(S): This study was conducted between November and December 2023 at Istanbul University-Cerrahpasa with 105 second-year nursing students enrolled in surgical nursing courses. Data were collected using a 13-item Assessment Tool for Surgical Hand Washing Skills (ATSHWS) and demographic questionnaire. Content validity was established through expert review, and reliability was assessed through inter-observer agreement and test-retest analysis. FINDINGS: Content validity was excellent (CVI: 0.976). Inter-observer reliability demonstrated strong agreement (ICC: 0.951, p<0.001), and test-retest reliability confirmed temporal stability.
CONCLUSION(S): The ATSHWS provides a valid and reliable method for objectively evaluating surgical hand washing skills among nursing students and may be useful for educational assessment and quality improvement initiatives.

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15. **Infection Prevention and Control Knowledge, Attitudes, and Practices Among Patients and Informal Caregivers in Home-Based Care: A Systematic Review**

Authors: Shang, Jingjing;Chastain, Ashley M.;McDonald, Margaret V.;Wang, Jinjiao;Lee, Ji Won;Ji, Xuefan;Morse-Karzen, Bridget and Russell, David

Publication Date: 2025

Journal: American Journal of Infection Control

Abstract: Background: Infection prevention and control (IPC) remains a challenge in home-based care, a rapidly expanding care sector worldwide. Despite the central role of patients and informal caregivers, little is known about their knowledge, attitudes, and practices (KAP).; Methods: We conducted a systematic review, following PRISMA guidelines, to synthesize evidence on IPC-related KAP among adult patients and informal caregivers in home-based care. PubMed, CINAHL, and Embase were searched for peer-reviewed studies from 1990 to 2025. Eligible studies focused on IPC-related KAP in home healthcare or home-based care. Study quality was assessed using the 2018 Mixed Methods Appraisal Tool.; Results: Thirty-four studies met inclusion criteria. Knowledge gaps were common in condition- and device-specific areas such as nebulizer hygiene, catheter care, and wound management. Attitudes were influenced by perceived infection risk, stigma, and social responsibility. While hand hygiene was frequently practiced, adherence to more complex IPC behaviors, such as equipment disinfection and quarantine, was limited. Informal caregivers often assumed IPC

responsibilities without adequate training or support.; Conclusions: IPC-related KAP remains inconsistent among patients and informal caregivers in home-based care, especially in complex or resource-limited settings. Targeted education, caregiver support, and validated KAP assessment tools are needed to improve IPC in this growing sector. (Copyright © 2025. Published by Elsevier Inc.)

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16. **Effectiveness of measures taken by governments to support hand hygiene in community settings: a systematic review.**

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Publication Date: 2025

Journal: BMJ Global Health 10(Suppl 7) (pagination), pp. Article Number: e018929. Date of Publication: 16 Se 2025

Abstract: Introduction This systematic review aimed to identify and evaluate the implementation of government measures that support equitable and sustained hand hygiene practices in community settings. Methods We systematically searched 12 databases, including PubMed, Web of Science, EMBASE, CINAHL, Global Health, Cochrane Library, Global Index Medicus, Scopus, PAIS Index, WHO IRIS, UN Digital Library and World Bank eLibrary for peer-reviewed and grey literature published through late March 2023. Additional sources were identified through expert consultations and manual reference list checks of related reviews. Studies employing quantitative, qualitative or mixed-methods designs were eligible. Study quality was assessed using the Mixed Method Appraisal Tool. Government measures were categorised according to the Sanitation and Water for All Building Blocks framework: sector policy strategy; institutional arrangements; sector financing; planning, monitoring, review; and capacity development. Hand hygiene outcomes were classified as access, behaviour change or enabling environment and impact as positive, null or not evaluated. Results Thirty-one studies (24 journal articles and 7 grey literature) from 19 countries-mostly middle income (71%)-were included. Most focused on household (58%), schools (19%) or both (13%). A total of 75 government measures were identified, with sector policy strategy and capacity development being the most common (each 31%), followed by institutional arrangements (17%), planning, monitoring, review (13%) and sector financing (8%). Positive impacts were linked to 45 measures across all five Building Blocks in 17 studies. Conclusion This systematic review highlights diverse government measures supporting hand hygiene in community settings, with sector policy strategy and capacity development being the most frequently reported. While many government measures showed positive impacts, gaps remain in financing, implementation and sustainability beyond households and schools. Strengthening governance, increasing investment and expanding research on cost-effectiveness and implementation barriers are essential to improve hygiene initiatives and ensure equitable access.

17. **Synergistic Paradigms in Infection Control: A Review on Photodynamic Therapy as an Adjunctive Strategy to Antibiotics**

Authors: Soares, Jennifer Machado;Corrêa, Thaila Quatrini;Barrera Patiño, Claudia Patricia;Gonçalves, Isabella Salgado;Dos Santos, Gabriel Grube;Guimarães, Gabriela Gomes;de Lima, Rebeca Vieira;Lima, Thalita Hellen Nunes;Corrêa, Bruna Carolina;Cappellini, Taina Cruz de Souza;Silva Pereira, Maria Vitória;Resende, Anna Luiza França de Oliveira;Yakovlev, Vladislav V.;Blanco, Kate Cristina and Bagnato, Vanderlei Salvador

Publication Date: 2025

Journal: ACS Infectious Diseases 11(10), pp. 2671–2691

Abstract: The increasing threat of antimicrobial resistance necessitates developing novel strategies to enhance the efficacy of existing antibiotics. This review explores the potential of antimicrobial photodynamic therapy (aPDT) as an adjunctive approach to antibiotic therapy. A systematic literature search was conducted in major scientific databases, focusing on studies published in the past decade investigating the synergistic effects of aPDT with antibiotics. Selected articles were analyzed based on their experimental approaches, bacterial targets, photodynamic parameters, and reported treatment outcomes. aPDT induces bacterial cell damage by generating reactive oxygen species (ROS), enhancing antibiotic susceptibility, and reducing required dosages. Furthermore, the review highlights promising research on optimizing treatment parameters and antibiotic combination strategies to maximize therapeutic outcomes. Despite its potential, aPDT faces obstacles to treatment standardization, variability in bacterial responses, and clinical implementation hurdles. These challenges require standardized protocols, further in vivo studies, and regulatory advancements to integrate aPDT into mainstream antimicrobial therapy. Conclusion: The synergy between aPDT and antibiotics represents a promising frontier in infection control, offering a safer, more effective, and resistance-mitigating strategy for bacterial infections. Future research should focus on refining treatment parameters, assessing long-term clinical impacts, and facilitating the widespread adoption of aPDT as a complementary antimicrobial approach.

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18. **Platelet-rich plasma therapy: key infection prevention practices and strategies for safety risk reduction**

Authors: Stern, Rebecca A.;Andrews, Jennifer;Bashaw, Katherine and Talbot, Thomas R.

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Journal: Infection Control and Hospital Epidemiology , pp. 1–5

Abstract: Background: Platelet-rich plasma (PRP) injections are increasingly performed in outpatient settings to treat select musculoskeletal injuries, arthritis, hair loss, and wounds. There is a need for procedure-specific guidance and standardization of PRP practices to mitigate associated infection prevention (IP) risks such as bloodborne pathogen exposure and unsafe injection use.; Objective: Develop a standardized approach for PRP administration which incorporates existing IP regulatory and professional society guidance.; Methods: Observation and descriptive review of PRP injection protocols across subspecialties at a

tertiary medical center, focused on ambulatory IP and regulatory standards compliance. Development of a standardized operating procedure (SOP) to mitigate IP risks and align with regulatory guidance.; Results: Observations were completed in orthopedic, wound care, and oral maxillofacial surgery clinics. Variability in practice was noted for product labeling, centrifugation, and injection modalities. A multidisciplinary workgroup convened to develop and operationalize an SOP. Classification of PRP as a blood product introduced nuances to protocols for product preparation, handling, administration, labeling, and documentation to comply with regulatory standards.; Conclusions: Development and implementation of an SOP for PRP treatment requires an awareness of the scope of practice in a healthcare system and identification of pertinent regulatory standards for integration into workflows. Partnerships between IP teams, subspecialty clinical providers, blood safety experts, quality and safety teams, and healthcare technology are essential to minimize variability in practice, ensure safety of patients and healthcare personnel, and align with regulatory standards.

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19. **Identifying barriers and enablers to effective infection prevention and control in residential aged care: a qualitative study using the Theoretical Domains Framework.**

Authors: Tropea J.;Gilbert J.;Bennett N.;Lim L.L.;Buising K.L.;Fetherstonhaugh D.;Kwong J.C.;Johnson D.F.;Marshall C.;Flynn M.;Yates P.A.;Aboltins C.;Lim W.K. and Peters, S.

Publication Date: 2025

Journal: American Journal of Infection Control (pagination), pp. Date of Publication: 30 Se 2025

Abstract: BACKGROUND: Infection prevention and control (IPC) practices are crucial in residential aged care homes (RACHs), yet gaps between existing evidence-based recommendations and what is done in practice (called 'evidence -practice gaps) continue. Understanding barriers and enablers to implementing evidence-based IPC is essential for improving practice. This study aims to identify barriers and enablers to RACH staff performing evidence-based IPC practices, according to the Theoretical Domains Framework (TDF), and map these domains to associated behaviour change techniques (BCTs) to inform interventions.
METHOD(S): Semi-structured interviews were conducted with 28 staff from nine RACHs in Victoria, Australia. Interviews explored seven prioritised IPC evidence-practice gaps. The TDF guided data collection and analysis. Key domains were identified and mapped to BCTs.
RESULT(S): Key enablers included knowledge of IPC importance, access to equipment and resources, skills and experience, self-confidence, visual cues, and beliefs about protecting self and others. Main barriers were related to environmental context and resources, such as limited access to hand hygiene products and personal protective equipment. Social influences and competing priorities also posed challenges. The BCTs mapping suggested focusing on environmental setup, education, and infrastructure to support effective IPC.
CONCLUSION(S): Residential aged care staff reported engagement with evidence-based IPC, highlighting its importance. Barriers mainly related to environmental and resource factors. Recommended strategies based on BCTs offer actionable, resource-efficient interventions to improve IPC practice in RACHs.

20. **Impact of targeted interventions on healthcare-acquired infection prevention and control of Clostridium difficile infections.**

Authors: Zhang S.;Duan J.;Zhang L.;Liu S.;Meng X.;Peng X.;Liu W.;Wu A. and Li, C.

Publication Date: 2025

Journal: Antimicrobial Resistance and Infection Control 14(1), pp. 113