



Article scientifique

Lettre

2024

Published version

Open Access

This is the published version of the publication, made available in accordance with the publisher's policy.

Research priorities to strengthen environmental cleaning in healthcare facilities : the CLEAN Group Consensus

Gon, Giorgia; Dramowski, Angela; Hornsey, Emilio; Graham, Wendy; Fardousi, Nasser; Aiken, Alexander; Allegranzi, Benedetta; Anderson, Darcy; Bartram, James; Bhattacharya, Sanjay; Brogan, John; Caluwaerts, An; Padoveze, Maria Clara; Damani, & Nizam [and 23 more]

How to cite

GON, Giorgia et al. Research priorities to strengthen environmental cleaning in healthcare facilities : the CLEAN Group Consensus. In: Antimicrobial resistance and infection control, 2024, vol. 13, n° 1, p. 112. doi: 10.1186/s13756-024-01463-9

This publication URL: <https://archive-ouverte.unige.ch/unige:180949>

Publication DOI: [10.1186/s13756-024-01463-9](https://doi.org/10.1186/s13756-024-01463-9)

COMMENT

Open Access



Research priorities to strengthen environmental cleaning in healthcare facilities: the CLEAN Group Consensus

Giorgia Gon^{1*}, Angela Dramowski², Emilio Hornsey³, Wendy Graham¹, Nasser Fardousi¹, Alexander Aiken¹, Benedetta Allegranzi⁴, Darcy Anderson⁵, James Bartram⁶, Sanjay Bhattacharya⁷, John Brogan⁸, An Caluwaerts⁹, Maria Clara Padoveze¹⁰, Nizam Damani¹¹, Stephanie Dancer^{12,30}, Miranda Deeves⁴, Lindsay Denny¹⁴, Nicholas Feasey^{15,16}, Lisa Hall¹⁷, Joost Hopman¹⁸, Laxman Kharal Chetty¹⁹, Martin Kiernan²⁰, Claire Kilpatrick²¹, Shaheen Mehtar²², Christine Moe²³, Stephen Nurse-Findlay¹³, Folasade Ogunsola^{22,24}, Tochi Okwor²⁵, Bruno Pascual¹⁹, Molly Patrick²⁶, Oliver Pearse¹⁵, Alexandra Peters²⁷, Didier Pittet²⁷, Julie Storr²¹, Sara Tomczyk²⁸, Thomas G. Weiser²⁹ and Habib Yakubu²³

Abstract

Environmental cleaning is essential to patient and health worker safety, yet it is a substantially neglected area in terms of knowledge, practice, and capacity-building, especially in resource-limited settings. Public health advocacy, research and investment are urgently needed to develop and implement cost-effective interventions to improve environmental cleanliness and, thus, overall healthcare quality and safety. We outline here the CLEAN Group Consensus exercise yielding twelve urgent research questions, grouped into four thematic areas: standards, system strengthening, behaviour change, and innovation.

Keywords Environment cleaning, Healthcare facilities, Research priorities

*Correspondence:

Giorgia Gon

giorgia.gon@lshtm.ac.uk

¹ London School of Hygiene and Tropical Medicine, London, UK

² Stellenbosch University, Stellenbosch, South Africa

³ UK Health Security Agency, London, UK

⁴ Infection Prevention and Control Unit, Integrated Health Services, World Health Organisation (WHO) HQ, Geneva, Switzerland

⁵ The Water Institute, University of North Carolina at Chapel Hill, Chapel Hill, USA

⁶ University of Leeds, Leeds, UK

⁷ Tata Medical Center, Kolkata, India

⁸ Helvetas, Zurich, Switzerland

⁹ IPC Consultant, Brussels, Belgium

¹⁰ Universidade de São Paulo, São Paulo, Brazil

¹¹ Southern Health and Social Care Trust, Portadown, UK

¹² NHS Lanarkshire, Bothwell, UK

¹³ World Health Organization, Geneva, Switzerland

¹⁴ United Nations Children's Fund, New York, USA

¹⁵ Liverpool School of Tropical Medicine, Liverpool, UK

¹⁶ Malawi-Liverpool-Wellcome Trust Clinical Research Programme, Blantyre, Malawi

¹⁷ University of Queensland, Brisbane, Australia

¹⁸ Radboud University Nijmegen Medical Centre, Nijmegen, Netherlands

¹⁹ Terre des Hommes, Geneva, Switzerland

²⁰ Richard Wells Research Centre, University of West London, London, UK

²¹ KSHHealthcare Consulting, Glasgow, UK

²² Infection Control Africa Network, Cape Town, South Africa

²³ Emory University, Atlanta, USA

²⁴ University of Lagos, Lagos, Nigeria

²⁵ Nigeria Centre for Disease Control, Abuja, Nigeria

²⁶ Centers for Disease Control and Prevention, Atlanta, USA

²⁷ University of Geneva, Geneva, Switzerland

²⁸ Robert Koch Institute, Berlin, Germany

²⁹ Stanford University, Stanford, USA

³⁰ Edinburgh Napier University, Edinburgh, UK



Background

It is now well over a century since hygiene pioneers, like Florence Nightingale, introduced the importance of cleanliness to the healthcare community. This is highlighted in the 2023 joint global report by the World Health Organization (WHO) and UNICEF on the state of hygiene services in healthcare facilities [1]. The report flags huge gaps in knowledge, practice, and capacity building for environmental cleaning, here defined as the application of water and detergent, and disinfectant where necessary, to surfaces and non-critical equipment by cleaning staff [1, 2]. These gaps have serious consequences for both patient and health worker safety, worldwide and in particular in resource-limited settings [1, 3]. For example, of the hospitals participating in the 2023 joint report from the Eastern Mediterranean region only a third reported the presence of any formal training programmes for cleaning staff and the availability of cleaning protocols. Moreover, access to cleaning materials in low-income countries was only half of that found in high-income countries [1]. The 2023 report also highlights the paucity of data on environmental cleanliness and, hence, the inability to produce global or regional estimates. Other studies have reported high levels of surface contamination in patient areas in hospitals in low and middle-income countries [4–6]. Surface contamination is plausibly linked with healthcare-associated infections (HAIs) [7–9] because microorganisms on surfaces, such as surfaces in the bed area, are transmitted to patients directly, and also indirectly by hands or via equipment used by health workers, patients or visitors [10]. Emerging evidence about airborne dissemination leading to contamination of surfaces and people is a further consideration. The relative contribution of the environment to the burden of HAIs is uncertain—possibly contributing to 20% of the transmission [11]—and is likely to be context-dependent. Rigorous studies into achieving environmental hygiene using cost-effective interventions are few [7, 12, 13]. Bridging this gap offers opportunities to improve environmental cleanliness and, thus, overall healthcare quality and safety.

Main text

This commentary summarises the recommendations of the CLEAN Group Consensus exercise in the field of environmental cleaning; the full briefing is available at: https://media.tghn.org/medialibrary/2023/06/11730_LSHTM__CleanBriefing_PDF_FINAL_07042023.doc.pdf. [12] Convened by UK-PHRST, a multi-disciplinary stakeholder group (the CLEAN Group) was engaged to identify the most urgent and current implementation research questions focusing primarily on

resource-limited settings. The group had participants from Africa, Europe, Western Pacific, Asia, North and South America with research expertise in infection prevention and control, cleaning and disinfection, health policy, and implementation science.

Between March and October 2022, the CLEAN Group followed a systematic prioritisation process using the REPRISSE guidelines [14]. The 12 priority research questions identified fell into four thematic areas: standards, system strengthening, behaviour change, and innovation. For example, one question is “*What are the health system-level factors that can support the professionalisation of cleaning staff?*” By “professionalisation of cleaning staff”, we refer to the process of ensuring that cleaning procedures are performed by trained staff who are skilled and work with fair contractual arrangements that allow them to perform their duties with dignity and to participate in decision-making. In most contexts, cleaning staff are predominantly women and of low socioeconomic status [15, 16], and in some settings, ethnicity and other characteristics of self-identity also affect their status and treatment. These identities, cleaners’ self-agency and their limited autonomy, all intersect and impact on improving environmental cleaning. Research is urgently needed to explore options for the professionalisation of cleaning staff and with the full engagement of cleaning staff themselves. Empowering cleaning staff is part of the health services’ duty of care to keep patients, visitors and health workers safe.

Answering the 12 research questions highlighted by the CLEAN Group [17] would facilitate progress on universal quality of care, and universal coverage of safely managed drinking water, safely managed sanitation, and basic hygiene services (respectively Sustainable Development Goal 3 and 6). Environmental cleaning programmes should be seen as a critical part of health systems and should be aligned with the global and local calls to action to ensure quality and safety, such as achieving the WHO Infection Prevention and Control Core Components and global action plan and the Antimicrobial Resistant Global Action plan [18–20]. Indeed, successful cleaning programmes can only be achieved if their management, transparency and accountability are a priority at the institutional and health system levels [18, 21].

Beyond the priority questions, the CLEAN Briefing [12] also makes broader recommendations for implementation research in environmental cleaning. For example, there is a pressing need to have cleaning benchmarks. There are currently no internationally recognised standards for thresholds of cleanliness which demarcate unacceptable levels of risk of HAIs, and current suggested cleaning routines are

based on weak evidence. A further example is the need for research to contextualise environmental cleaning guidance, allowing for such factors as who has cleaning responsibilities and under what working conditions, whether services are contracted out, levels of human resources (numbers by levels of training and roles), access to clean water, sanitation and hygiene infrastructure, conditions and materials of items to be cleaned, cleaning supplies, patient flow and the wider facility-level organisational aspects to ensure accountability of environmental cleaning programmes.

Conclusions

In 1885, the London Times exposed the consequences of unhygienic conditions in military hospitals. Despite the intervening 139 years, cleanliness in healthcare facilities is still widely deficient, with adverse consequences for healthcare systems, budgets, and foremost—for the safety of patients and staff. Funders, policymakers and researchers can all play key roles in advancing the research agenda presented in the CLEAN Briefing, and ultimately ensuring cost-effective and contextually appropriate interventions are implemented to accelerate the much needed progress in this field.

Acknowledgements

Please could we include the following disclaimer statement for Nasser Fardousi and Emilio Hornsey as it is a requirement of our funders, thank you-The UK Public Health Rapid Support Team is funded by UK Aid from the Department of Health and Social Care and is jointly run by the UK Health Security Agency and the London School of Hygiene; Tropical Medicine. The views expressed in this publication are those of the author(s) and not necessarily those of the Department of Health and Social Care.

Disclaimers

The views expressed in this publication are those of the author(s) and not necessarily those of the UK Department of Health and Social Care. The opinions expressed in this article are those of the authors and do not reflect the official position of WHO. WHO takes no responsibility for the information provided or the views expressed in this Article.

Author contributions

GG WG and EH conceived of the comment piece. GG coordinated and wrote the initial draft. GG, AD, EH, WG, NF, AA, BA, DA, JB, SB, JB, AC, MCP, ND, SD, MD, LD, NF, LH, JH, LKC, MK, CK, SM, CM, SNF, FO, TO, BP, MP, OP, AP, DP, JS, ST, TGW, HY developed subsequent versions of the paper, read and approved the final manuscript.

Funding

The UK Public Health Rapid Support Team is funded by UK Aid from the Department of Health and Social Care and is jointly run by UK Health Security Agency and the London School of Hygiene & Tropical Medicine. The Reckitt Global Hygiene Institute supported the leading investigator's salary.

Availability of data and materials

The article discussed is available at https://media.tghn.org/medialibrary/2023/06/11730_LSHTM_CleanBriefing_PDF_FINAL_07042023.doc.pdf.

Declarations

Competing interests

All signatories work in the field of environmental hygiene research in LMICs. Dr Alexander Aiken, Dr Alexandra Peters and Dr Didier Pittet are on the editorial board of Antimicrobial Resistance and Infection Control.

Received: 9 January 2024 Accepted: 7 September 2024

Published online: 27 September 2024

References

- World Health Organization, United Nations Children's Fund (UNICEF). Water, sanitation, hygiene, waste and electricity services in health care facilities: progress on the fundamentals. 2023 global report. Geneva: WHO; 2023.
- WHO. Environmental cleaning and infection prevention and control in health care facilities in low- and middle-income countries. Geneva: World Health Organization; 2022.
- Ogunsola FT, Mehtar S. Challenges regarding the control of environmental sources of contamination in healthcare settings in low-and middle-income countries—a narrative review. *Antimicrob Resist Infect Control*. 2020;9:81. <https://doi.org/10.1186/s13756-020-00747-0>.
- Gon G, Kabanywany AM, Blinkhoff P, et al. The clean pilot study: evaluation of an environmental hygiene intervention bundle in three Tanzanian hospitals. *Antimicrob Resist Infect Control*. 2021;10:1–14. <https://doi.org/10.1186/s13756-020-00866-8>.
- Dramowski A, Aucamp M, Bekker A, et al. NeoCLEAN: a multimodal strategy to enhance environmental cleaning in a resource-limited neonatal unit. *Antimicrob Resist Infect Control*. 2021;10:35. <https://doi.org/10.1186/s13756-021-00905-y>.
- Furlan MCR, Ferreira AM, da Silva BL, et al. Evaluation of disinfection of surfaces at an outpatient unit before and after an intervention program. *BMC Infect Dis*. 2019;19:355. <https://doi.org/10.1186/s12879-019-3977-4>.
- Peters A, Schmid MN, Parneix P, et al. Impact of environmental hygiene interventions on healthcare-associated infections and patient colonization: a systematic review. *Antimicrob Resist Infect Control*. 2022;11:38. <https://doi.org/10.1186/s13756-022-01075-1>.
- Chau JPC, Liu X, Lo SHS, et al. Effects of environmental cleaning bundles on reducing healthcare-associated Clostridioides difficile infection: a systematic review and meta-analysis. *J Hosp Infect*. 2020;106:734–44. <https://doi.org/10.1016/j.jhin.2020.08.019>.
- Thomas RE, Thomas BC, Conly J, et al. Cleaning and disinfecting surfaces in hospitals and long-term care facilities for reducing hospital- and facility-acquired bacterial and viral infections: a systematic review. *J Hosp Infect*. 2022;122:9–26. <https://doi.org/10.1016/j.jhin.2021.12.017>.
- World Health Organization. WHO guidelines on hand hygiene in health care: first global patient safety challenge clean care is safer care. Geneva: WHO; 2009.
- Harbarth S, Maiwald M, Dancer SJ. The environment and healthcare-acquired infections: why accurate reporting and evaluation of biological plausibility are important. *Infect Control Hosp Epidemiol*. 2013;34:996–7. <https://doi.org/10.1086/671741>.
- Fardousi N, Hornsey E, Dramowski A, et al. PROSPERO protocol: effectiveness of interventions to improve cleanliness in hospital environments in low-and middle-income countries—a systematic review. 2022. https://www.crd.york.ac.uk/prospéro/display_record.php?ID=CRD4202324137 (accessed 29 September 2022)
- Tomczyk S, Storr J, Kilpatrick C, et al. Infection prevention and control (IPC) implementation in low-resource settings: a qualitative analysis. *Antimicrob Resist Infect Control*. 2021;10:113. <https://doi.org/10.1186/s13756-021-00962-3>.
- Tong A, Synnot A, Crowe S, et al. Reporting guideline for priority setting of health research (REPRISE). *BMC Med Res Methodol*. 2019;19:243. <https://doi.org/10.1186/s12874-019-0889-3>.
- Storr J, Kilpatrick C, Lee K. Time for a renewed focus on the role of cleaners in achieving safe health care in low- and middle-income countries. *Antimicrob Resist Infect Control*. 2021;10:59. <https://doi.org/10.1186/s13756-021-00922-x>.

16. Dancer SJ. Hospital cleaning: past, present, and future. *Antimicrob Resist Infect Control*. 2023;12:80. <https://doi.org/10.1186/s13756-023-01275-3>.
17. Gon G, et al. Clean briefing paper: research priorities for healthcare cleaning in resource-limited settings. London: UK Public Health Rapid Support Team, UK Health Security Agency/LSHTM; 2023.
18. WHO. Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: WHO; 2016.
19. WHO. Global action plan on antimicrobial resistance. Geneva: WHO; 2015.
20. WHO. Draft global action plan and monitoring framework on infection prevention and control (IPC), 2024–2030. 2024. Available at: <https://www.who.int/teams/integrated-health-services/infection-prevention-control/draft-global-action-plan-and-monitoring-framework-on-ipc>.
21. CDC, ICAN. Best practices for environmental cleaning in healthcare facilities in resource-limited settings. Atlanta, GA: US Department of Health and Human Services, CDC; Cape Town, South Africa: Infection Control Africa Networ 2019.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.