

CLEAN Briefing Paper

Research priorities for healthcare cleaning in resource-limited settings

April 2023

Introduction:

Maintaining a clean environment in healthcare settings is essential to the prevention of Healthcare-Associated Infections (HAIs) and the spread of Antimicrobial Resistance (AMR).¹⁻³ Despite progress, environmental cleaning is more often poorly financed and lacks routine data for monitoring, especially in resource-limited settings. Surveys indicate, for example, limited or no formal training for cleaning staff and a widespread lack of cleaning protocols.^{1,4-9} The limited evidence available suggests that environmental contamination is alarmingly high across in-patient hospital wards.¹⁰⁻¹⁴

Definitions:

Environmental cleaning refers to the application of **water** and **detergent**, and **disinfectant** where necessary, to surfaces and non-critical equipment by **cleaning staff – the cadre of focus**. **Cleaning staff** refers to individuals whose primary responsibility is environmental cleaning. By **professionalisation** of cleaning staff we refer to the process of ensuring that cleaning procedures are adhered to by trained staff who are skilled and work within contractual arrangements (including fair pay and workers' rights) that allow them to perform their duties with dignity, and with acknowledgement of the importance of their role in patient and health worker safety. The focus is on **resource-limited settings** which we define as settings with insufficient individual or societal resources—human, financial or technological to support a robust public healthcare system.¹

Research prioritisation:

The CLEAN Group undertook an iterative research prioritisation^{21,22} process, described in Annex I (CLEAN Briefing – Appendices), between March and October 2022.

Evidence gaps and brief purpose:

Several systematic reviews assessing interventions to improve environmental cleanliness have identified only small-scale, pilot studies in resource limited-settings.^{3,15-20} With no rigorous studies available and limited routine data, a multi-stakeholder group (the CLEAN Group) was convened by UK-PHRST in mid-2022 to identify the most urgent (immediate) **research questions to inform or enhance the implementation of best practices in surface and non-critical equipment cleaning in healthcare facilities in resource-limited settings**. Addressing these questions will ultimately strengthen the evidence-base on environmental cleaning, which, in turn, **can protect patients and care-givers** from HAIs and limit the spread of AMR in all settings.

Who we are:

The CLEAN Group includes individuals from Africa, Europe, Asia, Australia, North and South America, with expertise in infection prevention and control (IPC), hospital cleaning and disinfection, water, sanitation and hygiene (WASH), health policy, implementation science and clinical research in resource-limited settings. Cleaning staff are indirectly represented.

Solution statement:

We call on **funders to invest** in the research priorities highlighted below, on **policymakers to enable and support** such research, and on **advocates to promote** the need to fill these research gaps and support the most disadvantaged both working in and receiving care in healthcare settings.

The 12 priority research questions to enhance environmental cleaning best practices in healthcare facilities in resource-limited settings

Standards	1	How frequently (and at what diurnal time points) should high-touch surfaces in high-risk units be cleaned and disinfected to achieve adequate bioburden reduction?
	2	What are the human resource requirements to achieve microbiological cleanliness in different types of healthcare settings?
System strengthening	3	What are the minimum requirements at the health system-level to implement environmental cleaning programmes?
	4	What are the health system-level factors that can support the professionalisation of cleaning staff?
	5	What types of communities of practice and practitioners' networks are most useful for supporting environmental cleaning programmes?
Behaviour change	6	What are effective strategies to engage health facility decision makers in investing (financial and managerial commitment) in environmental cleaning?
	7	What are effective training techniques to improve the cleaning practices of cleaning staff?
	8	What are cost-effective strategies to sustain cleaning behaviour (maintaining frequency and quality)?
	9	What are effective behaviour change techniques to establish a facility culture (values and social norms) of environmental cleanliness?
	10	What are effective strategies to involve patients and caregivers in the improvement of environmental cleanliness?
Innovation	11	Is the use of detergents alone non-inferior/sufficient compared to the use of detergents plus disinfectants in reducing bioburden on non-critical/low-touch surfaces?
	12	Are locally produced disinfectants more cost-effective compared to existing (commercially available) disinfectants for bioburden reduction?

Overarching considerations for implementation research in environmental cleaning:

Accountability	<p>Improving environmental cleanliness is only feasible if its management, transparency and accountability becomes a priority at the institutional level and hence it becomes a shared responsibility at all levels: from managers to clinicians to support workers.</p>
Status of cleaning staff	<p>We recognise that in most contexts, cleaning staff are predominantly women and of low-social-economic status.^{4,6} In some contexts, ethnicity and other characteristics of self-identity may also play a role in the status and treatment of cleaning staff. Low literacy and education can also be important. The intersection of these identities, alongside the self-agency/autonomy of cleaning staff – who are typically neglected in the health system hierarchy, must also be considered to implement environmental cleaning programmes.</p>
Cleaning benchmarks	<p>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. Cleanliness standards which are possible to benchmark at low cost are needed.²³</p>
Cleaning expenditure	<p>Environmental cleaning currently receives limited financial support at all levels of the health system.⁵ Business cases and cost-effective evaluations are necessary.</p>
Policy alignment	<p>In addition to current national and international standards for cleaning,^{1,24} the implementation of environmental cleaning programmes must align with the wider strategy to improve IPC, AMR, and WASH along with the wider efforts to ensure universal quality healthcare coverage. Key standards include the IPC Core Components, the IPC minimum requirements, Global IPC Action Plan on AMR.²⁵⁻²⁷ Environmental cleaning programmes should also adapt and leverage existing IPC multi-modal strategies.</p>
Contextualisation	<p>To ensure replicability, it is essential to contextualise interventions aimed at improving standardised cleaning practices. Elements of contextualisation include, for example, “who” has cleaning responsibilities and under what working conditions, whether services are contracted out and what are the accountability mechanisms, levels of human resources (numbers by levels of training and roles), access to WASH infrastructure/ services, conditions and materials of items to be cleaned, and cleaning supplies, patient flow and other the wider, facility-level organisational aspects to ensure accountability of environmental cleaning programmes.</p>
Intervention co-design	<p>Cleaning staff are the prime recipients of environmental cleaning improvement programmes and as such should be an integral part of implementation design.</p>
Capacity strengthening	<p>There is a need to strengthen capacity for;</p> <ol style="list-style-type: none"> a. the development and delivery of training in environmental cleaning, b. the professionalisation of cleaning staff, and c. local implementation research in this field.
Implementation and behaviour change frameworks	<p>Researchers should use internationally recognised implementation and behaviour change frameworks (e.g., the Consolidated Framework for Implementation Research, the Behaviour Change Wheel or Intervention Mapping, and socio-ecological models)²⁸⁻³⁰ to map and report on environmental cleaning intervention research.</p>

Overarching considerations for implementation research in environmental cleaning:

Cleaning process	The appropriate frequency, timing and quality of environmental cleaning are essential actions to reduce bioburden (e.g., magnitude of microbial contamination). These assume the use of sufficient and high-quality cleaning products and materials, and water, and appropriate management of cleaning supplies.
Environmental sustainability	Environmental cleaning products or technology ought to minimise their environmental impact (from production to waste handling) as much as possible without sacrificing efficacy. ³¹
Disinfectants	Current issues with commercially-available disinfectants include problematic supply chains with a lack of quality control, poor regard for expiry dates, and inappropriate storage conditions. ³² Locally-produced disinfectants may be a suitable alternative. The application of regulations for all consumer products with disinfectant labels to improve their quality and effectiveness at the point of use needs to be strengthened.

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Appendix I. Research prioritisation process

The CLEAN briefing was part of the wider UK-PHRST research study delivered as a partnership between LSHTM and Stellenbosch University which aimed to investigate the current level of cleaning in LMIC health systems and what interventions are effective at improving it using a systematic review. The prioritisation process aimed at identifying the research needed to inform or enhance the implementation of best practices in surface and non-critical equipment cleaning in resourced-limited healthcare settings. The group was convened by the UK-PHRST and coordinated by the organising committee made of Giorgia Gon (GG), Nasser Fardousi (NF), Angela Dramowski (AD), Claire Kilpatrick (CP) and Wendy J. Graham (WJG) and experienced technical facilitators: Folasade Ogunsola (FO), Tochi Okwor (TO). Participants were selected based on the ongoing published literature on the topic of interest. In addition, invitees were asked to nominate others who would add value to the group. WJG, and CK have prior extensive experience in research prioritisation methods. We have also had the benefit of advice from UK-PHRST staff, Femi Nzegwu on alternative decision-making processes and Annie-May Gibb on equity and positionality considerations. The full list of participants and organisations can be found in the signatories list of the CLEAN Briefing.

The process involved the following steps:

- Identification of evidence gaps reviewing existing literature and themes
- Identification and selection of the prioritisation criteria and steps
- Discussions (workshop and online meetings) applying the prioritisation process.

We used the REPRISÉ guidelines for reporting on the prioritisation process in this Annex.²¹

<p>Step A</p>	<p>The organising committee identified systematic reviews^{3,15-20} which were shared and discussed with participants to consolidate the current evidence gaps on the topic. Participants were also invited to share their ongoing work and other relevant evidence on the topic. Based on the evidence gaps, three themes were selected: health systems, behaviour change and innovation and participants were asked to assign themselves to such themes for the follow-up discussions. Participants were asked to brainstorm research questions under each theme.</p>
<p>Step B</p>	<p>Following the CINHR methodology,²² the organisers drafted a prioritisation process and several potential prioritisation criteria that the participants were asked to comment, and re-draft. In addition, each participants had to select five criteria they felt would be more pivotal to use. Based on this exercise, five criteria were selected to inform prioritisation;</p> <ol style="list-style-type: none">1. Are the findings likely to reduce environmental or disease burden/improve health benefit OR severity of disease?2. Would the implementation of the research findings be a cost-effective reduction in the environmental burden/disease burden?3. Is there capacity and resources – human, financial resources and infrastructure to undertake the research?4. Would you say that the endpoints of the research would be sustainable within the context of interest?5. Are the research findings likely to affect the behaviour change of the targeted group highly? <p>A step-by-step guideline was created for the facilitators to ensure the prioritisation process was consistent across the groups and it followed the steps outlined in Step C.</p>

Step C

Facilitated hybrid workshop and online meetings. The ethos of the discussion was participatory and drew heavily on expert opinion, and experience. Iterative discussions were supported by guidance on how to draft adequate research questions (including a well-defined exposure and outcome, a target population and healthcare context), the use of PICO (Health Evidence. Developing an Efficient Search Strategy using PICO), and scoring via the prioritisation criteria identified in Step B. Participants were responding to each criterion anonymously with either of the following response options: yes (1), no (0), maybe/not sure (0.5), I don't have enough knowledge (99). An average was calculated for each criterion based on all responses (0-1).

The criteria specific and overall prioritisation score were shared at each iteration with all participants to inform further discussion. Research areas emerging from multiple groups were compiled into one to avoid duplication. Participants were also asked to justify the choice of research questions and discuss the context it would be generalisable to. Decisions on how to change, drop or select research questions were always gathered via unanimous consensus by the facilitators. All participants were asked to comment on the briefing note document. The organising committee was tasked with integrating these comments. Participants were asked to provide their support for the final version of the CLEAN Briefing note by adding the names under the signatory's section.

A survey was used to evaluate the prioritisation workshop held in June 2022. Implementation plans were beyond the scope of the group. This CLEAN briefing is meant to be the main means via which the public is informed of the output of this exercise. Participants' institutional websites, email networks and social media will be used to disseminate it.

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Conflict of interest:

All signatories work in the field of environmental hygiene research in LMICs.



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