RESEARCH PAPER

Housekeeping Service Quality and Biomedical Waste Management Compliance as per NABH Standards: A Narrative Review

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Abstract

Background: Hospital housekeeping and biomedical waste (BMW) handling are usually managed as support functions, yet both bear directly on infection prevention and staff safety. In India, the National Accreditation Board for Hospitals and Healthcare Providers (NABH) expects accredited organisations to show that cleaning practices and BMW handling meet statutory and professional requirements. How the two activities relate to each other has received little attention in the published literature.

Objective: To synthesise published evidence on housekeeping service quality and BMW management compliance, and to examine how both are positioned within the NABH accreditation framework.

Methods: A narrative review was conducted. Peer-reviewed articles, statutory instruments, and guidance documents from the World Health Organization, the Ministry of Environment, Forest and Climate Change, the Central Pollution Control Board and NABH were identified through structured searches and citation tracking, and were grouped thematically.

Results: The evidence shows that environmental surfaces act as a reservoir for health-care-associated pathogens, that visual assessment of cleanliness is unreliable, and that cleaning outcomes improve when staffing, training and objective monitoring are in place. Studies of BMW management in India repeatedly describe incomplete segregation, uneven knowledge among support staff, and gaps in record keeping and sharps safety, despite a detailed regulatory framework. Housekeeping staff are the group that collects, transports and stores most BMW, so weaknesses in housekeeping supervision and training translate directly into compliance failures. A set of measurable indicators that combines both domains is proposed.

Conclusion: Housekeeping quality and BMW compliance are better understood and audited as one connected system than as separate NABH checklist items. Hospitals preparing for or maintaining accreditation may benefit

from integrated indicators, competency-based training for support staff, and routine feedback of audit results to the people who do the work.

Keywords: housekeeping services; service quality; biomedical waste management; NABH accreditation; infection prevention and control; healthcare quality; occupational safety; India

How to cite this article: Linko Taling, Gara Taba, Lijempong Aier, Topo Karge Yudik, Tarh Yadek, Gopal, Shivshankar Tiwari ,"Housekeeping Service Quality and Biomedical Waste Management Compliance as per NABH Standards: A Narrative Review". Int J Drug Deliv Technol. 2026;16(90s):1252-1262. DOI: 10.25258/ijddt.16.90s.124

1. INTRODUCTION

Hospitals exist to treat illness, but they can also be places where illness is acquired. A systematic review of studies from low- and middle-income countries estimated the pooled prevalence of health-care-associated infection at roughly 15 per 100 patients, a level well above what is typically reported from high-income settings [1]. Prevention effort has understandably concentrated on hand hygiene, antimicrobial stewardship and device-related care bundles. The physical environment has attracted less attention, partly because its contribution to transmission was for many years assumed rather than demonstrated. That position has changed. Surfaces close to the patient can carry meticillin-resistant *Staphylococcus aureus*, vancomycin-resistant enterococci, *Clostridioides difficile* and *Acinetobacter* species, and contamination of a room has been linked with acquisition of the same organisms by the next occupant [2,3]. Several of these organisms remain viable on dry inanimate surfaces for weeks or months [4,5].

Housekeeping is the service that deals with this reservoir every day. Reviews of the evidence generally conclude that cleaning and disinfection contribute to infection control, while also noting that the quality of the supporting studies is variable and that effects are hard to separate from other concurrent measures [6-8]. One difficulty is measurement. Surfaces that look clean are not necessarily clean, and audits using fluorescent markers have shown that a large share of high-touch surfaces are never wiped during routine cleaning [9]. Where hospitals have increased cleaning hours and monitored the result, surface contamination has fallen [10], although such investment raises questions of cost that facilities must weigh [11].

A second stream of hospital waste raises a different set of risks. The World Health Organization estimates that about 85% of the waste produced by health-care activities is no more hazardous than household waste, while the remaining fraction is infectious, toxic or radioactive and needs special handling [12]. When the two fractions are mixed, the whole volume becomes expensive and dangerous to treat [13]. In India, biomedical waste is governed by the Bio-Medical Waste Management Rules, 2016 [14], amended in 2018 [15]. These Rules place the legal responsibility on the "occupier", meaning the hospital, but the daily work of collecting bags, moving them through corridors, cleaning bins and trolleys, and keeping the storage room in order is carried out largely by housekeeping and sanitation staff. BMW compliance is therefore partly a product of housekeeping service quality, whether or not hospital policy treats it that way.

NABH accreditation brings both subjects into a single assessment. The sixth edition of the hospital standards took effect on 1 January 2025 [16], replacing the fifth edition that had been in use since 2020 [17]. Both editions require organisations to maintain a safe, clean environment and to manage hazardous waste according to law. Housekeeping quality and BMW compliance are nevertheless discussed in most of the literature as separate topics, and the practical overlap between them is seldom analysed. This review attempts to close that gap. Its objectives were:

(a) to describe the evidence linking housekeeping service quality to infection prevention and patient and staff outcomes;

(b) to summarise the regulatory framework for BMW management in India and the findings of studies on compliance;

(c) to map the relevant expectations of NABH standards to housekeeping and BMW activities; and

(d) to propose an integrated set of indicators that hospitals can use for internal audit.

2. REVIEW METHODOLOGY

2.1 Design

A narrative review design was chosen. The topic spans clinical microbiology, environmental engineering, occupational health, service management and accreditation policy, and the primary studies differ too much in design and outcome measures to be pooled statistically. The review was nevertheless planned with an explicit search strategy and eligibility criteria so that readers can judge how the evidence base was assembled.

2.2 Sources and search strategy

Searches were carried out in PubMed/MEDLINE, Scopus and Google Scholar using combinations of the terms "hospital housekeeping", "environmental cleaning", "healthcare-associated infection", "service quality", "biomedical waste", "healthcare waste", "segregation", "needle stick injury", "NABH" and "accreditation". Boolean operators were used to combine terms within each theme. Regulatory and guidance documents were obtained from the websites of the World Health Organization, the Ministry of Environment, Forest and Climate Change, the Central Pollution Control Board and NABH. The reference lists of key articles were screened to identify further relevant sources. The final search was completed in [month and year of last search].

2.3 Eligibility criteria

Peer-reviewed articles, systematic and narrative reviews, official guidelines and statutory notifications published in English were considered. Priority was given to work published since 2000, although earlier foundational papers on quality of care were retained. Studies were excluded if they dealt only with domestic or industrial waste, if they described a treatment technology without reference to hospital practice, or if the full text could not be obtained.

2.4 Synthesis

Selected sources were read in full, and their findings were extracted into three domains: housekeeping and infection prevention; BMW regulation and compliance; and accreditation requirements. Within each domain, findings were compared and grouped by theme. No formal risk-of-bias scoring was applied, as is usual for narrative reviews, and the strength of each claim is therefore described cautiously in the text.

3. CONCEPTUAL BACKGROUND

3.1 Quality in hospital support services

Donabedian proposed that the quality of care can be examined through structure, process and outcome [18]. The model was designed for clinical care, but it adapts readily to housekeeping. Structure covers the resources available: trained staff, rosters, cleaning agents, colour-coded equipment, protective gear and written procedures. Process covers what staff actually do, such as the order of cleaning, correct dilution of disinfectants, contact time and attention to frequently touched surfaces. Outcome covers both clinical results, such as surface contamination or environment-linked infections, and the perception of patients and families, who often judge a hospital first by whether it looks and smells clean.

The perception side of service quality is commonly studied with the SERVQUAL framework, which measures the gap between expected and perceived service across five dimensions: tangibles, reliability, responsiveness, assurance and empathy [19]. Applied to housekeeping, tangibles include the condition of toilets, linen and equipment; reliability is the consistency of cleaning schedules; responsiveness is how fast a spill or a request is dealt with; and assurance and empathy are reflected in staff conduct. Taken together, the two frameworks suggest that housekeeping quality has a technical component, which determines safety, and an experiential component, which determines satisfaction (Table 1).

Table 1. Dimensions of housekeeping service quality in a hospital setting

Dimension	Application in hospital practice	Example indicator
Structure	Trained manpower, rosters, cleaning agents, colour-coded equipment, personal protective equipment, written SOPs	Staff per occupied bed per shift; SOP available at point of use
Process	Cleaning sequence, dilution and contact time, focus on high-touch surfaces, spill and terminal cleaning protocols	Proportion of audited rooms meeting the cleaning checklist
Clinical outcome	Reduced surface contamination; fewer environment-linked infections	Surface sampling results; outbreak or cluster investigations
Perceived outcome	Patient and attendant impression of cleanliness and courtesy	Cleanliness score in feedback forms; SERVQUAL gap scores
Staff safety	Immunisation, sharps injury prevention, correct use of protective equipment	Hepatitis B immunisation coverage; reported injuries

Source: Compiled by the authors, adapting the structure-process-outcome model and the SERVQUAL dimensions.

3.2 Biomedical waste: definition and hazards

The 2016 Rules define biomedical waste as any waste generated during the diagnosis, treatment or immunisation of human beings or animals, in research related to these activities, or in the production or testing of biologicals [14]. The hazards fall into two

groups. The first is occupational. Sharps contaminated with blood are the best documented, and one global estimate attributed about two million hepatitis B, 0.9 million hepatitis C and 170,000 HIV infections in a single year to sharps injuries among health-care workers [20]. Housekeeping and waste handlers are among the groups at risk, because injuries often occur downstream when sharps have been discarded in the wrong container. The second group is environmental and public health related. Poorly controlled burning of waste can release dioxins and furans, and untreated waste can contaminate soil and water [21].

4. HOUSEKEEPING SERVICE QUALITY AND INFECTION PREVENTION

4.1 Practices recommended in guidelines

Environmental infection control guidelines issued by the United States Centers for Disease Control and Prevention describe the core elements of hospital cleaning [22,23]. Surfaces should be cleaned before they are disinfected, because organic soil reduces the activity of many disinfectants. Cleaning should proceed from cleaner to dirtier areas and from higher to lower surfaces. Frequently touched surfaces, such as bed rails, call buttons, door handles and switches, need more frequent attention than walls or floors. Disinfectants must be prepared at the correct concentration and left in contact with the surface for the stated time, and cloths and mops should be changed or laundered between rooms. Terminal cleaning after discharge, and clear protocols for blood and body fluid spills, complete the picture. None of these requirements is complicated, but each depends on the person performing the task understanding why it matters.

4.2 Is cleaning effective, and how would we know?

Reviews of the environmental literature agree on the direction of the evidence but are cautious about its strength [6,7]. Most intervention studies were carried out during outbreaks or alongside other control measures, which makes it difficult to isolate the effect of cleaning. Even so, the pattern is consistent: when additional cleaning effort is directed at high-touch surfaces and monitored, contamination falls [10]. The corollary is uncomfortable. Without monitoring, hospitals cannot be sure that cleaning protocols are being followed. Visual inspection is the commonest method of assessment and the least reliable. Fluorescent marker audits, adenosine triphosphate bioluminescence and microbiological sampling each give more objective information, though each has limitations in cost, interpretation or turnaround time [8,9]. A pragmatic approach in resource-limited hospitals may be to combine structured visual checklists with periodic marker audits, using the results mainly for feedback to staff and not for punishment.

4.3 The housekeeping workforce

Housekeeping staff in many Indian hospitals are employed by contractors, work in rotating shifts, and have limited formal education. The literature on how this arrangement affects cleaning quality is thin, and claims in either direction should be made carefully. What can be said is that cleaning programmes need dedicated supervision, standard procedures, regular training and a reasonable workload per person if they are to work [11]. Staff safety is part of this. The 2016 Rules require occupiers to immunise workers who handle BMW and to provide training at induction and at least once a year [14], which directly overlaps with the needs of housekeeping staff. A hospital that invests in training for housekeeping therefore advances cleaning quality and BMW compliance at the same time.

5. Biomedical Waste Management: the Regulatory Framework in India

5.1 The Bio-Medical Waste Management Rules, 2016

The 2016 Rules replaced an earlier set from 1998 and widened the scope to include vaccination camps, blood donation drives and other settings beyond hospitals. The earlier ten categories were consolidated into four colour-coded streams (Table 2), each with a defined container and treatment route [14]. The Rules require that waste be segregated at the point of generation, that bags and containers be labelled, that untreated waste not be stored for more than 48 hours, and that waste be handed over only to an authorised common biomedical waste treatment facility, or treated on site under authorisation from the State Pollution Control Board. Laboratory and microbiological waste must be pre-treated at the source by disinfection or autoclaving. Occupiers must keep records, report accidents, and submit an annual report to the State Pollution Control Board.

Table 2. Colour-coded categories of biomedical waste under the 2016 Rules

Category and container	Waste included	Treatment or disposal route
Yellow: non-chlorinated plastic bag	Human and animal anatomical waste; soiled waste (dressings, cotton and other items contaminated with blood or body fluids); expired or discarded medicines; chemical waste; contaminated chemical liquid; contaminated linen and bedding; microbiology and biotechnology waste	Incineration or plasma pyrolysis; deep burial only where permitted; sub-category specific. Laboratory waste pre-treated at source
Red: non-chlorinated plastic bag or container	Contaminated recyclable plastic items such as tubing, bottles, intravenous sets, catheters, urine bags, syringes without needles, and gloves	Autoclaving or microwaving followed by shredding; sent to authorised recyclers
White (translucent): puncture-, leak- and tamper-proof container	Waste sharps including needles, syringes with fixed needles, scalpels and blades	Autoclaving or dry heat sterilisation, then shredding, cutting or encapsulation; final disposal as specified
Blue: puncture-proof cardboard box	Broken or discarded contaminated glass including vials and ampoules; metallic body implants	Disinfection or autoclaving, followed by recycling

Source: Summarised from the Bio-Medical Waste Management Rules, 2016 [14]. Readers should consult the notified text for sub-category detail.

5.2 The 2018 amendment

The 2018 amendment required the phasing out of chlorinated plastic bags (other than those used for blood bags), gloves and blood bags within a stated period, and introduced a bar-code tracking system for bags and containers, together with the use of GPS in vehicles carrying BMW to treatment facilities [15]. For housekeeping staff, the practical effect was a change in the bags and bins they handle and, in hospitals that adopted bar coding, a recording step at the point of collection. Changes of this kind are a recurring source of confusion when staff are not retrained.

5.3 Treatment technologies and the role of common facilities

Most hospitals in India do not treat their own waste but hand it over to common treatment facilities that use incineration, autoclaving, shredding and, in some cases, plasma pyrolysis [24,25]. This reduces the burden on individual hospitals but makes segregation even more important, because contaminated or mixed loads can be rejected or treated inappropriately. It also places the hospital's internal storage area under scrutiny. The storage room is a space where BMW from the whole facility is collected, and its cleaning, ventilation, pest control and access are matters of housekeeping as much as of waste management.

6. NABH STANDARDS RELEVANT TO HOUSEKEEPING AND BMW

NABH standards for hospitals are organised into ten chapters, grouped broadly into patient-centred and organisation-centred domains [16]. Two chapters bear most directly on the topic of this review. The infection control chapter, labelled Hospital Infection Control (HIC) in earlier editions and Infection Prevention and Control in the sixth edition, deals with the infection prevention programme, including environmental cleaning, disinfection and the safe handling of waste. The Facility Management and Safety (FMS) chapter addresses the hospital environment, including management of hazardous materials and waste [16,17]. The sixth edition also introduces sustainability considerations, which strengthen the

link between waste management and organisational policy [16].

For the purposes of this review, the expectations of the two chapters are summarised in Table 3 in terms of operational areas rather than numbered objective elements, since the numbering differs between editions. Assessors typically seek three kinds of evidence: that a documented procedure exists, that staff have been trained in it and can describe or demonstrate it, and that the organisation monitors its own performance and acts on the results. Hospitals preparing for assessment sometimes concentrate on the first, with policies filed and signage displayed, while the second and third are weaker. A housekeeper who cannot explain what goes into a red bag, or a storage log that is completed only before an inspection, shows the distance between documentation and practice.

Table 3. Operational areas of housekeeping and BMW management mapped to accreditation expectations

Operational area	General expectation under infection control and facility safety chapters	Typical evidence reviewed
Cleaning and disinfection of patient areas	Documented procedures with defined frequencies; correct use of disinfectants; separate processes for isolation areas	SOPs, cleaning checklists, audit scores
Segregation, collection and internal transport of BMW	Segregation at source in accordance with statutory rules; colour-coded containers; safe transport routes and trolleys	Bin audits, signage, observation of transport
Storage and final disposal	Designated, secure storage; handover to authorised facility; maintenance of records	Registers, manifests, copies of authorisation
Staff training and safety	Induction and periodic training; immunisation; protective equipment; post-exposure management	Training records, immunisation register, injury log
Monitoring and improvement	Indicators defined, data analysed, corrective action taken	Dashboards, committee minutes, action-taken reports

Source: Summarised by the authors from the general intent of the infection control and facility management chapters [16,17]. Objective-element numbering and wording differ between editions.

7. COMPLIANCE WITH BIOMEDICAL WASTE MANAGEMENT: WHAT THE LITERATURE SHOWS

7.1 Knowledge and segregation practice

Cross-sectional surveys from different Indian regions have documented uneven knowledge of BMW management among health-care personnel, with gaps most commonly reported among support staff and, in some studies, among junior clinicians [26-28]. These surveys usually rely on self-reported questionnaires, which tend to overstate good practice, and sample sizes and settings vary. Even allowing for this, the broad picture is repeated across studies. Knowledge of colour-coding is better than knowledge of the reasons behind it, and awareness of the legal framework is lower still. A survey of private hospitals in Fars province, Iran, similarly found incomplete separation of infectious waste from general waste [29], suggesting that the problem is not unique to one country or regulatory setting.

A critical appraisal of BMW management in India points to a gap between the intent of the Rules and their implementation, particularly in smaller facilities that lack dedicated staff, storage and training [25]. Another review argued as early as 2012 that hospitals needed a structured BMW management system with clear responsibilities and records [30]. Although the 2016 Rules and their amendment addressed many of the issues raised then, published evaluations of whether compliance has improved at facility level remain limited.

7.2 Sharps and occupational injury

Sharps injuries remain the most visible occupational consequence of poor waste handling [20]. Injuries to waste handlers commonly arise from overfilled containers, needles recapped or discarded loose in soft bags, and sharps that have been placed in the wrong stream by clinical staff. These are events that housekeeping staff experience even though they did not cause them. WHO guidance recommends that sharps containers be replaced when about three-quarters full and that handlers wear suitable protective equipment [12]. Underreporting of injuries is widely recognised, so injury logs should be read as a floor, not a ceiling.

7.3 The COVID-19 experience

The COVID-19 pandemic put the BMW system under unusual strain. Volumes of masks, gloves, gowns and other protective equipment increased sharply, and health systems worldwide struggled with storage,

transport and treatment capacity [31]. In India, the Central Pollution Control Board issued specific guidance on the handling of waste from COVID-19 wards, quarantine centres and home care, including double bagging, dedicated bins and tracking [32]. For housekeeping teams, the period meant heavier workloads, greater exposure and constant changes in procedure. Whether the gains in awareness during this period have been retained is not yet clear from published work.

Table 4. Selected evidence relevant to housekeeping quality and BMW compliance

Source	Focus	Main message relevant to this review
Allegranzi et al. [1]	Burden of health-care-associated infection in developing countries	High prevalence of infection supports attention to environmental risk factors
Dancer et al. [10]	Enhanced cleaning in a UK hospital	Additional, monitored cleaning effort was associated with lower surface contamination
Carling and Bartley [9]	Evaluation of hygienic cleaning	Many high-touch surfaces are missed; visual assessment is unreliable
Pandit et al.; Mathur et al.; Sharma et al. [26-28]	Knowledge and practice surveys in India	Uneven knowledge across staff cadres; gaps in understanding of rationale and law
Prüss-Üstün et al. [20]	Global burden of sharps injuries	Sharps injuries cause a substantial burden of bloodborne infection among health workers
Askarian et al. [29]	Hospital waste survey, Iran	Segregation of infectious and general waste was incomplete
Datta et al. [25]	Critical appraisal of BMW management in India	Implementation gaps, especially in smaller facilities
Sharma et al.; CPCB [31,32]	Waste management during COVID-19	Waste volumes and risks surged, requiring rapid procedural change

Source: Compiled by the authors from the studies cited.

8. DISCUSSION

8.1 Why housekeeping quality and BMW compliance should be treated together

The studies reviewed here come from different disciplines, but a common thread runs through them. The same people, the same equipment and the same supervisory structure underlie both cleaning quality and BMW handling. A housekeeping attendant who is trained, protected, supervised and respected is more likely to clean correctly, to notice and report a mislabelled bag, and to handle a sharps container safely. A housekeeper who is untrained, short of time and uncertain about what is expected will fail on both counts. The two subjects also intersect physically. Bins, trolleys and storage rooms must themselves be cleaned and disinfected, spills of blood and body fluid must be managed as both a cleaning and a waste event, and the movement of waste through clean corridors is an infection control matter as well as a regulatory one.

Segregation at the point of generation is the responsibility of the clinical team, and the Rules are explicit about this. Yet errors made at the bedside are inherited by housekeeping staff, who are then blamed when audit results are poor. Accreditation assessment that looks only at the final stage of handling, or only at the documents, can miss this chain of responsibility. An integrated view allows hospitals to ask where in the chain a failure begins, rather than where it is most easily seen.

8.2 Barriers to good practice

The literature and practical experience point to a recurring set of barriers. Staff turnover is high in support services, so training given once is quickly lost. Many handlers have limited literacy, which makes written SOPs less useful than pictorial aids and demonstration. Contractor arrangements can blur accountability between the hospital and the agency. Colour-coded bins and liners are not always available in sufficient quantities or in the right places. Protective equipment may be issued but not worn, particularly in hot working conditions. Supervisors may be responsible for too many areas to observe practice in more than a few of them. Cost pressures appear in the choice of cleaning agents and in the willingness to increase staffing [11]. At facility level, reliance on a

distant common treatment facility can also make staff feel that waste handling is somebody else's problem once the bag leaves the ward.

8.3 Enablers

Several measures appear repeatedly in successful programmes. Training should be competency-based, with staff demonstrating skills and not only attending a lecture, and should be repeated at regular intervals and whenever rules or products change. Audit results should be fed back promptly to the staff who work in the audited area, and good performance should be acknowledged. Immunisation, protective equipment and post-exposure arrangements should be in place before an injury occurs, not after. Infection prevention teams, nursing leadership and housekeeping supervisors need a shared forum in which both cleaning and BMW data are reviewed. Technology such as bar-code tracking can improve traceability [15,25], though it does not replace correct behaviour at the source. Accreditation itself can act as an enabler by providing external expectations and a deadline, as long as it is used to improve practice and not merely to prepare documents.

8.4 A proposed integrated audit framework

Table 5 offers a set of indicators that combine housekeeping and BMW measures. They are intended for use by hospital quality teams as part of routine internal audit, and they can be adapted to the size and resources of a facility. The indicators emphasise observed practice over documentation and are consistent with the three kinds of evidence typically sought in accreditation assessment. The framework is proposed for discussion and has not been validated; field testing in hospitals of different size and ownership would be needed to establish feasibility and reliability.

Table 5. Proposed integrated indicators for housekeeping quality and BMW compliance

Indicator	Measure	Frequency	Data source
Cleaning of high-touch surfaces	Percentage of marked surfaces found cleaned after routine cleaning	Monthly, rotating areas	Fluorescent marker audit
Cleaning checklist compliance	Percentage of audited rooms meeting all checklist items	Weekly	Supervisor audit
Correct segregation at source	Percentage of sampled bins with no wrong-category waste	Weekly	Bin audit by infection control nurse
Sharps container management	Percentage of containers replaced at or before three-quarters full	Monthly	Ward observation
Sharps and splash injuries	Number of reported injuries per 100 staff per year, by cadre	Monthly, reported quarterly	Injury and exposure log
Immunisation of handlers	Percentage of housekeeping and waste staff with completed hepatitis B vaccination	Quarterly	Occupational health register
Training coverage and competence	Percentage of staff trained in the last twelve months who pass a practical check	Quarterly	Training records, skills assessment
Storage and disposal compliance	Percentage of days on which waste is handed over within 48 hours with complete records	Monthly	Storage register, handover manifest
Perceived cleanliness	Mean cleanliness and courtesy score from patients and attendants	Monthly	Feedback survey

Source: Proposed by the authors, drawing on the indicators and requirements discussed in Sections 3 to 7.

9. IMPLICATIONS FOR PRACTICE AND POLICY

For hospital managers, the first implication is that housekeeping should be positioned within the quality system and not outside it. Housekeeping supervisors need a voice in infection prevention committees, and BMW responsibilities need to be written into job descriptions at every level, from clinician to attendant. Second, investment in training for support staff is likely to produce returns on several fronts simultaneously: cleaner surfaces, safer waste

handling, fewer injuries and better results in accreditation assessments. Third, audit data should be used for learning. An audit programme that is experienced by staff as punishment will tend to encourage concealment, while one that provides feedback and support will tend to reveal real problems.

For policymakers and accreditation bodies, the review suggests value in giving explicit attention to the interface between cleaning and waste handling, perhaps through combined assessment questions or shared indicators. The increased attention to sustainability in the sixth edition of the NABH standards may provide an opportunity to do this [16]. Guidance for smaller hospitals, where resources are limited, could emphasise a minimum set of low-cost practices that offer most of the benefit.

10. LIMITATIONS

This review has several limitations. It is a narrative review, and although the search strategy was explicit, the selection of sources involved judgement and may reflect some bias. Searches were restricted to English-language publications, so relevant work in other languages may have been missed. Much of the Indian literature on BMW is made up of small, single-site, cross-sectional surveys using self-reported data, which limits the strength of conclusions. Few studies have examined housekeeping quality and BMW compliance together, so the integrated perspective offered here is partly inferential. The NABH standards were discussed at the level of general intent, and readers should consult the current standards manual for exact requirements. Finally, the audit framework in Table 5 is a proposal, and has not been tested.

11. DIRECTIONS FOR FUTURE RESEARCH

Several questions would benefit from empirical work. Observational and quasi-experimental studies could examine whether better housekeeping supervision and training translate into higher BMW segregation scores and fewer injuries. Multi-centre studies of accredited and non-accredited hospitals could examine whether accreditation is associated with measurable differences in cleaning and waste practice, rather than in documentation alone. Qualitative research with housekeeping staff would help to explain why procedures are or are not followed in practice, a perspective that is largely absent from the published record. Finally, evaluation of the proposed integrated indicators, including their reliability across assessors and their usefulness for improvement, would be a practical contribution.

12. CONCLUSION

Housekeeping service quality and biomedical waste management compliance depend on the same workforce, the same supervisory arrangements and, to a large degree, the same training needs. The evidence reviewed indicates that surfaces matter for infection prevention, that cleanliness cannot be judged reliably by eye, and that BMW compliance in India is still limited by gaps in segregation, knowledge and sharps safety despite a detailed regulatory framework. NABH standards provide an external structure for both subjects. Hospitals are likely to gain most when they treat the two as one system, measure what staff actually do, and give housekeeping personnel the training, equipment and recognition that the work requires. The integrated indicators proposed in this review are offered as a starting point for such an approach, and for the field testing that would show whether it works.

Declarations

Conflict of interest: The authors declare that they have no conflict of interest.

Funding: [State funding source, or "No funding was received for this work"].

Ethical approval: Not applicable, as this article is a review of published literature and did not involve human participants or primary data collection.

Author contributions: [Describe the contribution of each author, for example conceptualisation, literature search, writing of the original draft, and review and editing].

Data availability: No new data were generated. All sources analysed are cited in the reference list.

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