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REVIEW

Comparison of national and subnational guidelines for hand hygiene

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Summary Hand hygiene promotion is considered as the cornerstone for healthcare-associated infection prevention. Over the past years, hand hygiene guidelines have been developed by different agencies at international, national and subnational levels. A comparison of these documents could help in understanding recommendations in different parts of the world and the methods used for their development. Guidelines were identified through search engines, electronic libraries, and personal contacts, and their content was analysed using an adapted version of a tool from the European DG XII-funded HARMONY project. Twenty-two guidelines were retrieved and 21 were evaluated. Documents varied in scope, approach, content and terminology. Some were primarily advisory directives, whereas others focused on the technical issues of why, when, and how to perform hand hygiene. The extent to which evidence was collected and assessed varied considerably and details were provided only in very few. Grading systems and definitions to indicate the strength of evidence and recommendations also differed. The intended outcome was to improve hand hygiene practices in healthcare, thus leading to a reduction of healthcare-associated infections and/or antimicrobial resistance. Although overall agreement on indications and procedures was noted, the range and depth of recommendations on best

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practices and implementation varied. Essential aspects such as compliance measurement and audits to assess guideline effectiveness were neglected in most documents. In conclusion, there is a need for a more consistent approach leading to recommendations based on a thorough evaluation of evidence and applicable worldwide. Aspects related to implementation and impact monitoring deserve greater attention.

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Introduction

Hand hygiene is a simple, practical and cost-effective means of reducing healthcare-associated infections (HCAIs).¹ Recognising this, the World Health Organization (WHO) has adopted hand hygiene improvement in healthcare facilities worldwide as one of the priority interventions of its patient safety initiatives.^{2,3} The First Global Patient Safety Challenge of the WHO World Alliance for Patient Safety, aimed at reducing HCAI worldwide, has developed the *Guidelines on hand hygiene in health care (advanced draft)* in 2005 as one of its principal actions.³⁻⁵ Guidelines for hand hygiene have been prepared by various professional bodies and national agencies both prior to and after the publication of the WHO Guidelines. An analysis of recommendations in guidelines produced by 10 countries was published in 2001.⁶ However, several guidelines included were not formal publications agreed upon nationally or subnationally and the analysis did not consider many aspects of their development and design that could be useful for the drafting of the WHO guidelines.

Hence, we conducted a review of published national and subnational guidelines on hand hygiene using a structured and multifaceted approach with the aim of understanding the similarities and differences among existing recommendations in different countries, the process followed for their development and the evolution of the approach to hand hygiene. The results show a considerable diversity and well demonstrate the need for a thorough and standardised evaluation of the evidence as a solid basis for the development of recommendations and their grading hierarchy. We consider that these results will be of use to those involved in adapting guidelines to meet local needs.

Methods

Different search strategies were used to retrieve available guidelines including search engines such as Google[®] and electronic resources such as PubMed[®]

and the Guideline International Network. The search had no limits for the starting date and was extended until June 2008. Keywords used were 'hand hygiene', 'hand washing', 'handwashing', 'hand rubbing', 'handrubbing', 'hand decontamination' and 'guidelines' in various combinations. Requests for hand hygiene guidelines were also made to members of the WHO First Global Patient Safety Challenge core group of experts and its hand hygiene national campaigns network (see WHO website), national representatives of the European Union hospital infection network (Hospital in Europe Link for Infection Control through Surveillance) and WHO regional offices. No language restriction was applied.

A grid was prepared to analyse the documents by adapting a tool from the European DG XII-funded HARMONY (Harmonisation of Antibiotic Resistance measurement, Methods of typing Organisms and ways of using these and other tools to increase the effectiveness of Nosocomial infection control; see HARMONY website) project, developed originally to evaluate antibiotic policies in different hospitals and used in several other infection control-related projects.^{7,8}

The main aspects considered in the comparison were: basic information about the guideline (e.g. year of publication, endorsing body, and mode of publication); the guideline development process (e.g. national as opposed to subnational, developers, target population and methods for evidence evaluation and recommendation development); recommendations made and details about indications, technique and products recommended for hand hygiene; and recommended strategies for hand hygiene improvement and guideline implementation.

A group of six infection control experts scrutinised the guidelines and inserted information into the grid. Inter-observer accuracy and consistency checks were performed to ensure validity of the method.

Results

Twenty-one guidelines were obtained for comparison. These included 15 national guidelines from

Australia, Belgium, Canada, Egypt, England, France, Germany, Ireland, Nepal, Russian Federation, The Netherlands, Tunisia, Scotland, Sweden and the USA, and six subnational guidelines from Ontario and Manitoba (Canada), Liverpool, Southampton, Mid-Cheshire and Bassetlaw National Health Service hospitals (NHS Trusts: England).^{9–29}

Eighteen guidelines were available through websites and 14 were in English. Guidelines in other languages were translated into English, except for one (Greek) which was excluded. All but one were developed either by professional societies involved in infection prevention and the control of antimicrobial resistance, or by governmental agencies such as the ministry of health. In some cases, recommendations on hand hygiene were part of much wider infection control or antimicrobial stewardship guidelines.

The documents varied in scope, approach, and content. Some were primarily intended as advisory directives,^{9,13,15,16,22,23} whereas others focused on the technical issues of why, when, and how to perform hand hygiene.^{12,17,20,26–29} Developers of the ‘advisory’ type of document focused mainly on evidence gathering and making general recommendations applicable to different settings and areas. They also hinged more on specific issues related to implementation such as technical details, popularising practices, and logistics with some referring to companion materials for certain details, such as training guides and other national guidelines. Several guidelines contained a long, detailed text in addition to the evidence for recommendations.

The extent to which evidence was collected and assessed varied considerably. Only three guidelines described clearly the method used for collecting or selecting evidence.^{10,13,16} Seven national and two subnational guidelines graded the evidence for recommendations (Table I).^{11,13–16,22–24,26} However, different grading systems and definitions were used to indicate the strength of evidence and recommendations (Table I). The quality of evidence was based on expert consensus in three documents.^{11,15,22} The grading was performed using the methods adopted by the National Institute for Health and Clinical Excellence (NICE) from the Scottish Intercollegiate Guideline Network (SIGN) for the EPIC (Evidence-based Practice in Infection Control) 2 guidelines.¹³ Published guidelines used as references were assessed using the AGREE (Appraisal of Guidelines’ Research and Evaluation) instrument in one document.¹³ There were additional differences in the individual statements defining the grade hierarchy. For example, the US Centers for Disease Control and Prevention (CDC) Category 1A is ‘strongly recommended for

Table I National/subnational guidelines for hand hygiene: grading of evidence used in different documents using a ranking system

	USA ^a			England ^b				France			Canada			Germany				Sweden			Ireland					
	IA	IB	IC	N	1	2	3	4	1	2	3	1	2	3	1A	IB	II	III	IV	I	II	III	I	II	III	
Randomised controlled trials	✓				✓							✓														
Well-designed studies		✓																								
Suggestive studies																										
Case-control studies																										
Non-analytical studies																										
Theoretical rationale																										
Most experts																										
Mandated by government																										
Unresolved issue																										

^a Centers for Disease Control and Prevention guidelines.

^b EPIC (Evidence-based Practice in Infection Control) 2 guidelines.

implementation and strongly supported by well-designed experimental, clinical or epidemiological studies', while the France Category 1 is 'strongly supported by well-designed studies and does not pose economical or technical problems'. In the EPIC 2 guidelines, evidence grades 1 and 2 were further classified into three (i.e. 1, 1⁺, and 1⁺⁺). In general, there were three to five grades of evidence and recommendations. The quantum of evidence and details of data from studies presented varied considerably. This probably reflects differences in the evidence-gathering and assessment process. Although the recommendations formulated in most documents were based on expert consensus, the validation process was often unclear. Only seven documents described internal or external peer review and public consultations as methods of validation.^{11,13–16,22,24}

Several guidelines stated appropriately that there is a need for periodic revision based on new evidence and indeed some were currently being revised (e.g. the French and Belgian guidelines).^{10,14} Based on the original CDC evidence-based guidelines published in 2002,²³ a 'How-to Guide' for hand hygiene was produced by the Institute for Healthcare Improvement (IHI) a few years later.³⁰ Four guidelines,^{21,24–26} one revised guideline,¹³ and the IHI 'How-to Guide' document³⁰ were published after the publication of the advanced draft of the WHO guidelines (i.e. November 2005 onwards). Interestingly, only three of these six documents referred to the WHO publication.^{21,24,30}

Healthcare workers were the main target population in all guidelines. Since all were national and subnational documents, policy-makers (local authorities, institutional authorities, etc.) were also possible intended users but this was specified only in nine documents.^{9,13,16,21,23–26,28} The intended settings were also not specified exactly in most documents. Seven documents mentioned healthcare in community settings in addition to hospitals.^{9,21,24–26,28,29} We surmise that the others are intended to be used primarily for care in hospital settings and, although not specified in many documents, most recommendations appear to relate to inpatient care.

Most documents stated that the intended outcome was to produce an improvement in hand hygiene in order to contribute to a reduction in pathogen transmission and ultimately HCAs and/or antimicrobial resistance. However, audit and measurable indicators were mentioned in only nine.^{11,13,14,16,21,23,24,26,28}

Administrative approaches (e.g. an emphasis on the binding nature of the document) for guideline

implementation varied. Fourteen documents recommended the implementation of the guidelines as a priority and eight stressed adherence to the guideline as a requirement.^{9,10,13,14,16,20,21,23–29} All subnational guidelines include this statement.

Although the general concepts concerning indications and methods to perform hand hygiene practices were similar in essence in all documents, the terminology used to describe various issues differed considerably, thus making exact comparisons difficult. For example, terms such as 'decontamination' and 'antisepsis' were used synonymously in different documents. The definition of terms used to classify situations where hand hygiene practices are indicated differed between documents. For example, in some cases, 'social' indications meant contacts other than patient care (between HCWs, casual social contact between patient and HCWs, etc.). In others, the same word was used to include all situations where plain soap and water were recommended as the method for hand cleansing, including visible soiling with blood and body fluids. Others did not classify indications, but merely provided lists. In the present evaluation, three types of indications for hand hygiene were considered: social (physical contact unrelated to patient care), patient care and surgical hand preparation. According to this classification, most guidelines appear to have focused on the latter two types of indication. Five guidelines, three national and two subnational, were developed primarily for routine patient care and had only social and routine patient-care indications.^{11,13,19,25,26}

Although indications and methods for hand hygiene were the focus for several national and all subnational guidelines, the level of detail described varied considerably. In general, the subnational guidelines tended to have more technical details with more comprehensible illustrations than the national documents which were more advisory in nature. In some documents, the approach was to describe the methods according to indications (e.g. 'before' and 'after' indications and then the appropriate methods) and, in others, the indications for a given method (e.g. all indications requiring hand rubbing) of hand hygiene.

Most guidelines advocated hand hygiene for a variety of, but similar, 'before' and 'after' indications. Some documents advised that the decision for hand hygiene and choice of methods be based on risk assessment by the HCW.^{26,29} Many guidelines also had 'umbrella' indications that included many different situations for hand hygiene. In these cases, the HCW was left to evaluate whether hand hygiene was required or not for

individual situations. The indications listed were given as examples and were not intended to be taken as a complete list, at least in some documents. There were also differences in wording between documents which led to differences in situations included under one stated indication.

Overall, stated indications were consistent across different guidelines (Table II). Among the indications 'before' an activity for routine patient care, performing invasive procedures was the most frequently mentioned. Among indications for 'after' procedures during routine patient care, visible soiling of hands, and contact with blood, body

fluids, wounds, catheter sites or drainage sites were mentioned most often. A few documents listed situations where hand decontamination was not required, including before nursing care or the physical examination of non-immunocompromised patients, before and after short or social contact with non-immunocompromised patients, and after contact with surfaces not suspected of being contaminated.^{10–12,14,19}

Hand washing was the standard for routine patient care in seven documents,^{9,11,12,18,20,28,29} and alcohol-based hand rub in seven.^{13–15,19,22–24} Either hand washing or hand rubbing were

Table II Guidelines mentioning indications for hand hygiene before, after, and between activities (1998–2008)

Timing of action	Guidelines (N = total)	References
Before an activity		
Performing invasive procedures	18	9–11,13–19,21–28
Any direct patient contact	16	9,11,13–17,21–29
Preparing, handling, serving or eating food, and feeding a patient	12	11,13–16,19,21,24–28
Beginning of workshifts	11	10,12,14,16,20–22,25–28
Care of particularly susceptible patients	10	10–12,14–17,19,21,28
Contact with catheter sites and drainage sites	10	9,10,13–15,19,22,23,27,28
Eating	10	9,11,12,14,16,17,20,21,27,28
Patient contacts that may pose an infection risk to the patient	9	10,13–16,18,19,22,28
Contact with wounds	8	10,14–16,19,22,25,27
Using (any) gloves	7	9,12,17,23,24,26,27
Using sterile gloves for invasive procedures (not surgical)	6	15–17,20,23,27
Direct contact with patients colonised with antimicrobial-resistant organisms	6	10,14,17,19,20,27
Preparing and giving medication	6	21,24–28
Handling of clean materials	4	12,15,20,28
Entering the clean part of staff changing rooms of operation areas, sterilisation department, or other aseptic areas	2	15,21
Use of computer keyboard	1	21
Caring activities after risk assessment	1	10
Injections or venepuncture	1	9
After an activity		
Contact with blood, body fluids, wounds, catheter sites or drainage sites	16	9–12,14,15,17,19,20,22–28
Visible soiling of hands	15	10–23,26
Glove removal	14	9–11,13–17,21,23–25,27,28
Personal body functions	14	9–12,15,16,19–21,23,25–28
Contact with infectious patients	13	10–12,14–17,19,21,23,26–28
Contact with wounds	11	10–12,14–16,19,22–24,26
Contact with patient's intact skin	11	13,14,16,17,19,21,23,24,26–28
End of work shift	9	12,14–16,20,21,25,27,28
Contact with inanimate objects in the immediate vicinity of the patient	7	10,14,16,21,23,24,26
Microbial contamination	5	10,11,16,19,22
Suspected or proven exposure to spore-forming pathogens	1	23
Contact with items known or suspected to be contaminated	1	25
Using computer keyboard	1	21
Between activities		
Contact with different patients	9	10–14,18–20,28
Moving from a contaminated to a clean body site of the same patient	7	10,11,14,16,23,24,28
Different caring activities on the same patient	4	11,14,26,28
Contact with different patients in high risk units	3	10,16,28

recommended in seven.^{10,16,17,21,25–27} Most guidelines, especially subnational, provided details of the procedures for hand hygiene and the analyses of their content in this regard are presented in Table III. Hand washing was recommended in all documents for soiled hands, although the use of medicated soap was specified in some.

Several strategies were considered for promotion and implementation of the guidelines. Here again, details were more developed in the subnational guidelines. In most cases, strategies recommended for implementation and sustainability were multimodal (Table IV).

Eight documents outlined how to choose a hand hygiene product.^{14–16,21,23–26} Roles and responsibilities of stakeholders were considered in a very basic manner in eight documents.^{9,13,14,16,21,24,26,28} Ten guidelines stressed the need for active healthcare worker involvement for successful implementation,^{9,11,13,16,20,21,23–26} and four had recommendations for patient participation.^{23–25,28} Outlines for the location of hand-washing facilities were provided in 13.^{9–12,15,16,19,21,24–28} References to wider safety issues were made in four documents.^{16,21,23,24} Costing and cost-effectiveness

were neglected areas with just two documents providing very basic information on these aspects.^{10,13}

Discussion

Guideline preparation is a complex task which should be carried out in the most rigorous manner, especially evidence gathering and definition of the scope, goals and target population. For this reason, guidelines defining standardised minimum criteria to ensure the quality of the final document have been issued by WHO.³¹

Compared with a previous publication which identified only 10 guidelines on the same topic in 2000, this review covers a considerably higher number of guidelines that include recommendations to define and promote optimal hand hygiene practices during healthcare delivery.⁶ The thriving nature of these types of guidelines over the past few years may be due to the increased awareness of the importance of infection control following the severe acute respiratory syndrome (SARS) outbreaks and the need for preparedness to other potential pandemics. It reflects also the numerous

Table III Inclusion of specific recommendations regarding hand hygiene techniques in national/subnational guidelines (1998–2008)

	Routine (N = 21)		Surgical (N = 16)	
	Hand washing	Hand rubbing	Hand washing	Hand rubbing
Preparation (removal of rings, bracelets, etc.)	19		13	
Surfaces to be cleaned	18		10	
Brushing technique	—		9	
Recommended Agent	21	19	16	8
	Soap: 21 Liquid (plain or medicated): 20 Bar soap as alternative: 3	Gel: 4 Other: not specified	Medicated bar or liquid soap	
	No. of documents where the following are mentioned			
Quantity of product ^a	10	10	4	3
Duration	18 (10–15 s in most)	13 (15–30 s) Some: until dry	15	6
Drying	21	—	13	—
Disposable/sterile towel	21	—	12	—

^a Some other documents refer to the manufacturers' recommendations.

Table IV Recommended components for the implementation strategy in national/subnational guidelines (1998–2008)

Component	Guidelines (N = 21)	References
Healthcare workers' skin care	18	9–11,13–19,21–29
Regular staff training	15	9,11,13,14,16,17,20–26,28,29
Alcohol-based hand rub at the point of care recommended:		
Wall-mounted dispensers	11	10,14–16,18,21,23,24,26–28
Pocket bottles	3	14,23,28
Performance monitoring		
Direct observation of hand hygiene compliance	9	11,13,14,16,21,23,24,26,28
Product consumption	3	13,16,23
Tools for audits provided	3	16,23,24
Combination of the four elements above	9	11,13,14,16,21,23,24,26,28
Reminders	8	16,21,23–28
Feedback	6	11,13,14,21,23,24
Administrative sanctions	2	16,24

responses to the call for action to improve hand hygiene in healthcare launched in 2005 by the World Alliance for Patient Safety at both international and national levels.⁴ Despite this main common objective, wide variations in the scope, goals, content, breadth, and depth of topics covered were identified in hand hygiene guidelines. In addition, many documents did not provide a comprehensive coverage of some critical aspects related to proper guideline implementation and sustainability. Lack of uniformity in terminology further compounded analytical differences and often no glossary was provided, thus assuming that a healthcare worker understood the meaning of a certain term. It was not possible to find exhaustive explanations for these differences and deficiencies. Factors related to an often ill-defined, variable target audience, local constraints, and culture and local traditions might have influenced different approaches.

If the WHO concept of 'My five moments for hand hygiene' is used as the reference point, the most frequently recommended indications on when to perform hand hygiene are (1) before invasive procedures (2) before patient contact and (3) after body fluid exposure (cited in 18, 16 and 16 guideline documents, respectively).³² The more neglected moments cited were after patient contact and after contact with inanimate objects in the immediate vicinity of the patient (cited in 10 and 7 documents, respectively). This reflects the well-known lack of awareness that even the environment and patients' intact skin are contaminated by harmful pathogens that can be transmitted through hands.^{33,34} Furthermore, recommendations in some guidelines were formulated in such a way that the healthcare worker had eventually to make his/her own decisions as to when

and how to perform hand hygiene. In others, the recommendations were buried or even scattered throughout a large infection control manual. These factors certainly make it more difficult for healthcare workers to determine whether hand hygiene is a high priority and more difficult for policy-makers to develop and implement strategies to encourage and sustain hand hygiene improvements nationally or locally. Although we would have liked to analyse the structure and design of the guidelines and how they might have been influenced by their target population, it was often difficult to identify the latter. Most appear to be targeting the healthcare worker, but we could not always determine the setting or the possibility that other stakeholders were influencing the guideline details, such as politicians, policy-makers or even patient advocates.

A general lack of reference to a quality improvement process was noted in many guidelines and mention of validation and audit was often lacking. Actual guideline implementation is a very critical point that strictly depends on effective strategies to translate recommendations into practice and strong and persistent administrative support. Implementation has often been proven deficient, even for high quality and well-recognised guidelines such as those issued by the CDC.^{23,35} According to our review, only nine guidelines mentioned the importance of auditing implementation and/or suggested indicators for measuring related targets at local or national levels. On the other hand, most guidelines recognised that multiple elements were essential for a successful implementation strategy, as repeatedly evidenced in the literature.³⁶

Interestingly, only three of the six documents post-dated the 2005 advanced draft of the WHO

guidelines.⁵ This may reflect a perception (communicated to B.C.) that as the WHO guidelines were planned to be updated following a rigorous test period, these modifications would be extensive.

The final WHO guidelines will be made available in 2009 and will have partly taken on board the above-mentioned concerns and bridged most of the gaps in our knowledge. These guidelines, including their advanced draft, comprise the most extensively referenced and comprehensive document for hand hygiene developed so far. They are intended for use by policy-makers, managers, and healthcare workers in different settings and geographical areas. In many countries, guideline- and policy-developers are already using the advanced draft of the WHO guidelines as a resource for adaptation to local needs and logistics.⁵

Guidelines developed by the CDC in 2002 are also used as a reference internationally.²³ Both WHO and CDC guidelines are documents prepared specifically to promote hand hygiene. Both documents reviewed the evidence extensively on a wide variety of topics related to hand hygiene and used a similar grading system. However, while the CDC guidelines are primarily intended for use in the USA and other Western countries, the WHO guidelines were conceived in a more global perspective and represent the challenge to bridge the gap between developing and developed countries, regardless of resources available. For example, instructions are included for the production of alcohol-based hand rubs locally and at low cost. Furthermore, a significant added value of the WHO guidelines is the fact that their feasibility has been tested in settings with different cultural backgrounds³⁷ and development levels.³⁸

Although the CDC guidelines were considered as a very valuable framework, the more extensive WHO guidelines explore many innovative issues such as religious and cultural aspects of hand hygiene, promotion of hand hygiene on a national scale, and social marketing, and more attention has been paid to some topics, particularly safety issues, infrastructures required for hand hygiene, and strategies for improvement.

It is planned to revise and update the WHO guidelines every two to three years. The regular revision of guidelines is of the utmost importance since the body of evidence is constantly evolving, especially concerning their impact on practices and ultimate patient safety outcomes. Thus, institutions in charge of producing and/or updating hand hygiene guidelines at country level will have the opportunity to take advantage of the regular revision of the WHO guidelines rather than making

individual efforts. Furthermore, although the adaptation to the local setting and needs must be prioritised, the reference to an internationally acknowledged guideline can lead to a more standardised and rigorous approach which is currently lacking in most guidelines reviewed here. Indeed, the results of our analyses confirm the lack of uniformity of hand hygiene guidelines worldwide and the urgent need not only for practical and internationally accepted recommendations on many different aspects of hand hygiene, but also for guidance in implementing these recommendations. Despite these differences and the lack of accuracy in some cases, the existence of a growing number of guidelines on hand hygiene, most of which have been issued over the last eight years, represent the acknowledgement by countries of the importance to ensure patient safety and the firm intention to make significant progress in infection control worldwide.

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