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FEATURES

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Publication During the COVID-19 Pandemic

Victoria Williams MPH, CIC, Editor-in-Chief
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The appearance of a new disease, such as the COVID-19 pandemic, brings with it a rapid increase in the volume of information and research available, and the evolution of policies and practices. While information learned and tools developed can be shared informally among peers, the wider dissemination of information requires publication. In order to facilitate this process, the Wellcome Trust issued a statement in January 2020, which has since been signed by numerous international journals, publishers, professional organizations and societies, funding organizations, academic institutions, corporations and government agencies [1]. They called upon “researchers, journals and funders to ensure that research findings and data relevant to this outbreak are shared rapidly and openly to inform the public health response and help save lives”. This would be accomplished by making peer-reviewed research publications freely available for the duration of the pandemic at a minimum, and potentially longer. Interim research findings would also be made available before journal publication. Many journals have created COVID-19 resource centres or content archives where publications related to the pandemic can be accessed and the World Health Organization has created a global research database that is updated daily with currently international and multilingual scientific literature [2]. The COVID-19 Open Research Database (CORD-19), a free resource created by the Semantic Scholar team at the Allen Institute for AI, includes more than 100,000 articles about COVID-19 [3].

Although increased and fast-paced access to research findings has myriad benefits for the scientific community, there are some disadvantages. As the number of submissions increases and the time from receipt to final publication is shortened, the formal process of peer review may suffer. Peer-review involves having experts in the field evaluate a publication and serves two purposes. One, it ensures that published research is of a high quality by reviewing its validity, significance and originality. Two, it improves the quality of the manuscript by providing suggestions to the authors and identifying any errors [4]. Generally, this process from submission to publication takes months, but has been shortened to days and weeks for online publication of COVID-19-related articles. One study comparing the length of the publication process for 14 different journals during and prior to the COVID-19 pandemic found an average decrease in the turnaround time of 49% for COVID-19-related manuscripts, but no change for articles not related to COVID-19 [5].

Many authors have also taken to publishing studies online prior to peer review, preprint publication, which raises the concern that findings are made available to the public prior to review and verification [6,7]. For example, in March 2020, an article on the use of hydroxychloroquine in COVID-19 patients was published online and subsequently the International Society of Antimicrobial Chemotherapy, the journal’s sponsoring organization, released a statement agreeing with the concerns raised about the article’s findings [8,9]. Similarly, the Lancet and New England Journal of Medicine retracted articles as data could not be verified [10,11].

The large number of submissions and fast turnaround time also has human resource implications. Editors, editorial board members and reviewers are also researchers, clinicians, and frontline healthcare workers who have seen their workloads and commitments increase such that they are not available to commit to the time required to assist in the peer review and publication process [6]. The pace at which editorial board members need to provide reviews is likely unsustainable in the long term. As a result, the future of scientific publication may be permanently changed. The benefits of open and fast publications have been recognized as critically important for efficient communication and knowledge sharing in the face of a new infectious disease. Pre-prints, and all of the potential risks of no prior peer review that comes with them, do improve coordination and timely dissemination of research, and may continue to play a role beyond this pandemic [12]. The peer-review process itself might change to accommodate the necessary and expected fast turnaround time. Journals may incorporate new strategies, such as opting to review methodology prior to submission of a full manuscript to ensure the methodology is valid early on, or reviewers could share their feedback with authors in real time allowing corrections to be made before all of the reviews have been completed [6]. Regardless of how the process of scientific publications evolves, the need for validated research and thorough peer review by qualified reviewers won’t change.

It is also worth noting that the pandemic has had a disproportionate effect on the authorship of women compared to their male counterparts. In reviewing COVID-19-related studies published in March and April, one study identified a 19% reduction in articles not related to COVID-19 published in March and April, one study identified a 19% reduction in articles not related to COVID-19 compared to their male counterparts [13]. Others have reported similar findings [14]. One can only hope that as the pandemic evolves, work-life balances can be restored and this disparity can be resolved.

There is also a risk that COVID-19-related research will overshadow other...
important research in the frenzy to produce and publish relevant and timely work to aid in the pandemic response. When time permits, it is important to revisit the work that was submitted as abstracts to cancelled conferences, such as IPAC Canada and APIC and consider publication. The issues, research and interventions that inspired these submissions remain vital to IPAC practice and need to be shared with our peers.

We would like to express our appreciation to the members of the editorial board who, despite increased workloads and demands on their time, have honoured their commitment to CJIC. Thank you to the external reviewers who graciously volunteered their time and skills in peer review. And finally, thank you to the authors for your ongoing submissions and for allowing us to disseminate your work to the infection prevention and control community, whether related to COVID-19 or otherwise.

REFERENCES
GUIDELINES AND POSITION STATEMENTS

POSITION STATEMENT:
Essential Oils in Healthcare Settings

This position statement was developed by the Standards and Guidelines Committee.
Chair: Madeleine Ashcroft
Principal Authors: Standards and Guidelines Committee

Publication Date
Original: 2019 November

This document was developed by IPAC Canada based on best available evidence at the time of publication to provide advice to Infection Prevention and Control Professionals. The application and use of this document are the responsibility of the user. IPAC Canada assumes no liability resulting from any such application or use.

BACKGROUND
The use of essential oils in various settings is growing, in part due to a move to ‘natural’ products and increasing marketing of these as substitutes for conventional medicine and vaccines, and as cleaning products. Oils are being applied topically, ingested, and diffused, often without sufficient scientific evidence to support these uses, or consideration of potential toxic effects [1]. While the use of essential oils may have perceived positive effects for an individual, such as a reduction in stress [2], there is currently insufficient scientific evidence or consensus that they are effective to prevent or treat communicable diseases such as influenza, or for use as cleaning products or pesticides/insect repellants, and they should not be promoted as such [3-6].

Studies have shown some essential oils to have antiseptic or antiviral properties (e.g., tea tree oil [7-9], elderberry extract [10], and natural phenols [11]), and while there is some promising research to show that essential oils may assist in illness prevention and treatment [8, 11], inhibit organism growth [7], or help to eliminate biofilms when used in conjunction with traditional antimicrobials [12], the majority of these studies are in vitro [7,11,13]. There are no established standard concentrations of essential oils, and currently insufficient evidence exists to recommend their use in healthcare settings such as hospitals, long-term care homes, and clinical offices (including physiotherapy and massage), residential settings such as retirement homes and group homes, and community settings such as schools and daycares. Some natural products may cause harm to individuals, when used as an adjunct to traditional medicine [14]. In addition, the scents and ingredients of essential oils and products containing these may cause allergic reactions [15-17], sensitization or phototoxic effects [18], and contravene facility “no scent” policies. Health Canada has explicit information regarding the use of essential oils, including that these should not be ingested, should not be applied to more than 10% of body surface area, and should not be used topically undiluted [18]. Organisms have been found to grow in essential oils and equipment used to diffuse these, and improper storage and/or sharing of equipment between individuals have been associated with outbreaks [19].

POSITION STATEMENT
- Essential oils are not a substitute for conventional treatment or vaccines. IPAC Canada recommends following national guidelines for immunization, including annual influenza vaccination.
- Essential oils are not sufficient for cleaning and disinfecting surfaces or reusable items in a healthcare setting. At minimum, environmental surfaces and inanimate items, or non-critical medical devices should be thoroughly cleaned and disinfected with a low-level disinfectant. This low-level disinfectant should have a drug identification number (DIN) from Health Canada, indicating its approval for use in Canadian healthcare settings [20], along with appropriate efficacy and contact time for the intended use, following manufacturer’s instructions for use.
- Diffusers/vaporizers should not be used in healthcare settings. If diffusers/vaporizers are used for/by an individual, they should be completely emptied and thoroughly cleaned and disinfected daily and more frequently if necessary, to prevent contamination, biofilm development, and resultant inhalation of any potentially pathogenic organisms [21].

GLOSSARY/DEFINITIONS
As per the Canadian Standard Association (CSA):
- “SHALL” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard;
• “SHOULD” is used to express a recommendation, or that which is advised but not required; and
• “MAY” is used to express an option, or that which is permissible within the limits of the standard, an advisory or optional statement.

Healthcare setting (CSA): “any location where healthcare is provided, including emergency care, prehospital care, hospitals, long-term care, home care, ambulatory care, and facilities and locations in the community where care is provided (e.g., educational institutions, residential facilities, correctional facilities, dental offices, and physician’s offices).”

Note: Definitions of healthcare settings can overlap, as some settings provide a range of care, such as chronic care or ambulatory care provided in acute care, and complex care provided in long-term care.” Clause 1.2 defines healthcare settings as: “including, but not limited to, all acute care hospitals; trauma centres; emergency care facilities; medical clinics with or without overnight stay or observation; endoscopy centres; laser eye clinics; outpatient surgical services; cosmetic surgical offices; dental general and surgical facilities; other office surgical facilities; general physician offices (with and without treatment spaces); stand-alone laboratory facilities; diagnostic imaging centres; nursing homes; long-term care facilities; assisted-living facilities; mental health facilities; forensic facilities; rehabilitation facilities; additional services facilities; chronic care facilities; group homes; hospice care facilities; stand-alone dialysis clinics; ambulatory clinics; walk-in health clinics; physiotherapy clinics; pediatric clinics; public health clinics; adult daycare centres; third-party reprocessors; educational settings; and private entrepreneurs [22].”

STAKEHOLDERS
Healthcare and other workers in acute care facilities, long-term care homes, clinical offices, and communal settings in the community

REFERENCES
22. Canadian Standards Association. CAN/CSA-Z314.-18 Canadian medical device reprocessing. Rexdale, ON: Canadian Standards Association; February 2018
La déviance positive : faire autrement pour améliorer l’hygiène des mains des infirmières

Positive deviance: Doing things differently to improve hand hygiene of nurses

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RÉSUMÉ

Contexte : Les difficultés rencontrées pour améliorer les taux d’adhésion à l’hygiène des mains des infirmières suggèrent que de modifier ce comportement est une tâche complexe. Une approche novatrice - la déviance positive - propose de déterminer la présence d’individus plus performants afin de comprendre les facteurs qui pourraient expliquer cette meilleure performance. Le but de cette étude était d’explorer, sous l’angle de l’approche de la déviance positive, les facteurs qui influencent la pratique de l’hygiène des mains des infirmières en contexte hospitalier québécois.

Méthode : Deux ethnographies focalisées ont été effectuées auprès de 21 infirmières sur une unité de médecine-chirurgie et une de soins palliatifs d’un centre hospitalier universitaire de Montréal. La collecte des données s’est déroulée en 2015, principalement lors de 18 entrevues individuelles et 14 périodes d’observation. Les données colligées ont été codées et regroupées sous des catégories.

Résultats : Au niveau individuel, les participantes reconnaissent l’importance des connaissances sur le rôle de l’hygiène des mains dans la prévention des infections. Au niveau organisationnel, on constate une pratique collaborative à l’intérieur de chacune des équipes de soins. Au niveau environnemental, la disponibilité des distributeurs de solution hydro-alcoolique facilite la pratique de l’hygiène des mains. Au niveau socioculturel, les deux équipes travaillent ensemble vers un but commun, ce que nous avons nommé cohésion sociale, favorisée sur l’unité de médecine-chirurgie par le leadership de son infirmier-chef et sur l’unité des soins palliatifs par une pratique de soins empreinte d’humanisme.

Discussion/Conclusion : Les connaissances découlant de cette étude permettent de comprendre qu’afin d’améliorer l’adhésion à l’hygiène des mains des infirmières, il serait préférable de cibler les équipes de soins qui performent le mieux afin d’y puiser des idées pour aider celles qui ont une moins bonne performance et d’élaborer des interventions qui intègrent des facteurs à plusieurs niveaux, non seulement au niveau individuel, mais aussi aux niveaux organisationnels, environnementaux et socioculturels.

MOTS CLÉS
Déviance positive; hygiène des mains; infirmières; ethnographie focalisée

ABSTRACTS

Background: Challenges encountered in improving nurses’ hand hygiene adherence rates suggest that changing this behavior is a complex task. An innovative approach-positive deviance—propose to identify better-performing individuals in order to understand the factors that could explain their better performance. The aim of this study was to investigate the factors influencing nurses’ hand hygiene practices at a Quebec hospital from the perspective of positive deviance.

Method: Two focused ethnographies were conducted involving 21 nurses on one medical-surgery unit and one palliative care unit at a Montreal university hospital. Data was collected in 2015, primarily during 18 individual interviews and 14 observation periods. The collected data was coded and sorted into categories.
INTRODUCTION

MÉTHODE
Nous avons utilisé l’approche de la déviance positive selon Bradley et al [3]. (Figure 1) et adapté les deux premières étapes à notre étude. Tout d’abord, nous avons identifié deux unités attestant de déviance positive – plus performantes au regard de la pratique d’hygiène des mains chez les infirmières – et par la suite, effectué deux ethnographies focalisées afin de comprendre les facteurs liés à cette meilleure performance.

APPROCHE DE LA DÉVIANCE POSITIVE: ÉTAPES

<table>
<thead>
<tr>
<th>ÉTAPE 1</th>
<th>Identifier les « déviants positifs » (DP): individus qui sont plus performants dans le domaine d’intérêt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ÉTAPE 2</td>
<td>Utiliser des méthodes qualitatives afin de découvrir les stratégies qui permettent aux DP d’être plus performants.</td>
</tr>
<tr>
<td>ÉTAPE 3</td>
<td>Vérifier si les stratégies utilisées avec succès par les DP pourraient améliorer le comportement d’autres individus de l’organisation.</td>
</tr>
<tr>
<td>ÉTAPE 4</td>
<td>Diffuser les stratégies des DP en collaboration avec des personnes-clé de l’organisation.</td>
</tr>
</tbody>
</table>

Adapté de Bradley et al., 2009

FIGURE 1: Étapes de l’approche de la déviance positive

Results: At an individual level, the participants recognized the importance of knowledge of the role of hand hygiene in the prevention of infections. At the organizational level, we observed collaborative practices within each care team. At the environmental level, the availability of alcohol-based hand hygiene dispensers facilitated hand hygiene practice. At the sociocultural level, the two teams worked together towards a common goal, a practice we refer to as social cohesion, encouraged on the medical-surgery unit by the head nurse’s leadership and on the palliative care unit by a humanistic care practice.

Discussion/conclusion: The knowledge gained from this study shows that, to improve nurses’ hand hygiene adherence, it would be preferable to target better-performing care teams so that we may draw on their ideas to help less performing teams and develop interventions integrating factors at several levels, not only individually but also organizationally, environmentally and socio-culturally.

KEYWORDS
Positive deviance; Hand hygiene; Nurses; Focused ethnography
Unités de soins
Un échantillon de cas exemplaires, défini comme un petit groupe de cas exceptionnels, qui réussissent et qui peuvent être par le fait même une source d’information [4] constitue la stratégie qui a servi à identifier les unités les plus performantes au regard de l’adhésion à l’hygiène des mains des infirmières. À cette fin, nous avons consulté les résultats des audits effectués entre août 2013 et décembre 2014 et nous avons calculé un taux moyen (%) d’adhésion à l’hygiène des mains des infirmières pour chacune des unités de soins. Nous avons par la suite identifié les deux unités les plus performantes au regard de l’hygiène des mains des infirmières, soit une unité de soins palliatifs (USP) avec un taux moyen de près de 70% et une unité de médecine-chirurgie (UMC) avec un taux moyen de près de 60%. Soulignons que la moyenne du taux d’adhésion des infirmières pour l’ensemble des unités de soins se situait à un peu plus de 30%.

Éthique
Il est à souligner qu’avec l’approbation du Comité d’éthique du centre hospitalier, le but de l’étude a été présenté aux infirmières œuvrant sur les deux unités choisies de manière plus large en incluant l’hygiène des mains aux mesures générales de prévention des infections associées aux soins de santé afin de ne pas influencer leur comportement au regard de l’hygiène des mains. Suite à la présentation de l’étude, les formulaires d’information et de consentement ont été remis aux infirmières et ces dernières avaient une semaine pour en prendre connaissance et accepter ou non d’y participer.

Observation
La doctorante en sciences infirmières a accompagné et observé les infirmières lors de toutes leurs interventions cliniques, participé aux échanges avec les patients, observé tout ce qui se déroulait sur les unités afin d’avoir un portrait le plus complet possible des facteurs qui influençaient l’hygiène des mains. L’observation s’est faite par blocs d’environ quatre heures consécutives à raison de deux à trois fois par semaine du 26 janvier au 30 mars 2015 sur l’UMC (environ 60 heures); du 10 septembre au 12 octobre 2015 sur l’USP (environ 25 heures).

Entrevues semi-structurées
Un total de 18 entrevues a été effectué et la durée moyenne variait de 45 à 60 minutes, mais certaines d’entre elles ont été de 90 minutes. Avec l’accord des participantes, les entrevues étaient enregistrées afin d’en permettre la transcription. Ces dernières se sont échelonnées du 22 mars

<table>
<thead>
<tr>
<th>TABLE 1: Données sociodémographiques des participantes</th>
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<td>Unité de soins</td>
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<td>Moyenne</td>
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**Analyse des données**


**Résultats**

Un total de 21 infirmiers (ères) a participé à l’étude, soit 15 (sur un total de 19) pour l’unité de médecine-chirurgie et 6 (sur un total de 9) pour l’unité de soins palliatifs. Les données sociodémographiques des participantes sont présentées dans le tableau 1. Quatre infirmières de l’unité de médecine-chirurgie et trois infirmières des soins palliatifs n’ont pas accepté de participer à l’étude, car elles mentionnaient être nouvelles ou ne prévoyaient pas avoir le temps pour cette activité. Toutefois, leurs opinions ont été consignées lors de conversations informelles.

Les résultats de l’étude montrent que les facteurs liés à la meilleure performance au regard de l’hygiène des mains sur les deux unités de soins peuvent être regroupés selon des facteurs individuels, organisationnels, environnementaux et socioculturels (Figure 2).

Au niveau individuel, les résultats de l’étude révèlent que les participantes connaissent l’importance de l’hygiène des mains et l’impact de cette mesure sur la prévention des infections. Elles mentionnent avoir suffisamment de connaissances sur les infections associées aux soins de santé, des conséquences de celles-ci sur les patients qui sont très vulnérables et de leur rôle de professionnelle pour en prévenir la transmission. Une participante ajoute que si certaines d’entre elles ne se lavent pas les mains « Ce n’est pas à cause d’un manque de formation » [Participante (P) 1, UMC]. Sur les deux unités, nous constatons que les participantes sont très au fait de leur rôle et responsabilité au regard de la prévention des infections associées aux soins de santé. Elles soulignent être conscientes qu’elles donnent des soins à des patients qui sont vulnérables et plusieurs d’entre elles mentionnent qu’adhérer à l’hygiène des mains est dictée par leur conscience professionnelle. Même si elles ont beaucoup de travail et qu’elles manquent de temps, l’une d’entre elles dit: « Je ne mettrais jamais le fait de ne pas me laver les mains sur le temps » (P2, USP). Les participantes disent qu’elles ont à cœur de protéger les patients et d’assurer des soins qui sont de qualité. « Si on ne se lave pas les mains, c’est comme si on contaminait notre patient […] ça fait partie du métier, ça fait partie du soin, donc si ce n’est pas fait, on ne fait pas notre travail » (P1, UMC). La protection et la sécurité des patients sont d’ailleurs deux facteurs qui reviennent très souvent dans les commentaires des participantes tant au cours des observations que lors des entrevues. « Les patients vont mourir, mais avant, ils peuvent être très malades, cela serait dommage qu’ils contractent, par exemple, un Clostridium difficile » (P2, USP). Sur ces deux unités de soins, la protection personnelle et par extension celle des membres de leurs familles est un facteur de motivation important pour les participantes dans leur adhésion à l’hygiène des mains. Ces dernières disent qu’en plus de protéger leurs patients, il est primordial de se protéger elles-mêmes, car elles ne veulent pas se contaminer et risquer de devenir malades.

Au niveau organisationnel, on constate une pratique collaborative à l’intérieur de chacune des équipes sur les deux unités. Sur l’UMC, le rôle que joue l’infirmier-chef dans l’adhésion à l’hygiène des mains des infirmières est certainement un facteur primordial. Tout au long des observations sur cette unité, on s’aperçoit qu’il est très

**Figure 2 : Facteurs liés à la meilleure performance au regard de l’hygiène des mains**

SHA = solution hydro-alcoolique

ICU = infirmier-chef de l’unité
présent et qu’il profite de chaque occasion pour féliciter les infirmières. Il semble évident que pour cet infirmier-chef, la prévention des infections associées aux soins de santé et particulièrement l’hygiène des mains est une priorité. Au fil des conversations informelles, il mentionne à quel point il prend à cœur la protection des patients et la sécurité des soins. Lors des rencontres mensuelles, l’infirmier-chef présente les résultats de surveillance d’hygiène des mains (audits) et encourage l’équipe de soins à proposer des solutions pour améliorer les taux. Qui plus est, on observe, sur les deux unités de soins, la collaboration et l’entraide entre les participantes – facteurs qui semblent aussi favoriser l’adhésion de ces dernières à l’hygiène des mains.


Quant aux facteurs socioculturels, les membres des deux équipes travaillent ensemble vers un but commun, ce que nous avons nommé cohésion sociale. Cependant, ce qui favorise cette cohésion diffère selon l’équipe de soins. Sur l’UMC, l’équipe s’est mobilisée sous le leadership de son infirmier-chef afin d’améliorer les taux d’adhésion à l’hygiène des mains. « Ici on se lave les mains ». Aux soins palliatifs, l’équipe de soins collabore afin que les patients soient confortables et qu’ils ne souffrent pas, et ce, avec une « attitude qui exprime beaucoup de compassion, de douceur et d’amour ». Les participantes disent faire en sorte que toutes les mesures soient prises afin de prévenir la transmission des infections et l’hygiène des mains en fait partie. « Tous les patients qui viennent en soins palliatifs n’ont plus de système immunitaire. Il faut qu’on les protège. On est là pour soigner. On essaie de bien soigner » (P6, USP).

**DISCUSSION**


Les participantes de l’UMC apprécient la rétroaction sur les résultats des audits afin d’en discuter et d’être impliquées dans les améliorations à apporter. Tout comme le mentionnent Atif et al [8] ainsi que Doronina et al [11], une rétroaction positive devrait être donnée aux infirmières dans leur pratique de l’hygiène des mains. Lawton et al [15] rappellent, quant à elles, que les professionnels de la santé ont besoin de recevoir des encouragements sincères et des messages constructifs, car ils sont souvent confrontés à des critiques. En lien avec nos résultats et ceux d’autres auteurs [16, 17], nous postulons que le leadership d’un gestionnaire est un facteur positif afin de soutenir une équipe de soins dans sa démarche d’amélioration puis de maintien des taux d’adhésion à l’hygiène des mains. De plus, Wendt et al [16] soulignent que le leadership de la part d’un gestionnaire a un impact favorable sur la cohésion à l’intérieur d’une équipe. Hu et al [17] ont démontré quant à eux que le tout se concrétisait par une amélioration de l’adhésion à l’hygiène des mains des infirmières. Considérant l’effet positif que semble avoir le leadership des infirmières(ères)-chefs sur la pratique de l’hygiène des mains des infirmières et constatant qu’il n’est peut-être pas donné à tous (tes) les infirmiers (ères)-chefs de posséder ce type de leadership, nous proposons que de la formation et du soutien leur soient offerts afin de les accompagner dans ce rôle essentiel. Par ailleurs, quelques auteurs, tels que Hilken et al [18], proposent d’impliquer des infirmières soignantes qui ont du leadership, à titre de « championne », aux programmes de prévention et
contrôle des infections. Selon Goedken et al [19], le rôle de championne au regard de l’hygiène des mains pourrait aider à améliorer cette pratique par la promotion, le coaching informel et le rappel à leurs pairs. Cependant, nous sommes en accord avec ces auteurs [19], qu’il peut être complexe d’ajouter ce type de responsabilités à des infirmières qui sont déjà surchargées et qui n’ont peut-être pas l’autorité fonctionnelle pour accomplir ce rôle.

Nos résultats font ressortir la plus-value d’une pratique collaborative qui s’exprime à l’intérieur de deux équipes de soins qui travaillent ensemble vers l’atteinte d’un but commun. Cependant, nous constatons que ce qui favorise cette collaboration diffère selon l’équipe de soins. Sur l’UMC, les infirmières se sont impliquées et ont collaboré avec le soutien continu de leur infirmier-chef afin d’améliorer les taux d’adhésion à l’hygiène des mains. Aux soins palliatifs, les infirmières ont travaillé en équipe afin de protéger des patients vulnérables qui sont en fin de vie et une adhésion renforcée à l’hygiène des mains en a découlé. Selon Dadich et al [20], les équipes de soins palliatifs sont habiles à travailler ensemble; ces dernières démontrent un engagement envers leurs patients et n’hésitent pas à utiliser leur créativité pour s’adapter aux besoins de ces derniers.

L’implantation des solutions hydro-alcooliques (SHA) dans les milieux de soins a certes permis de faciliter l’adhésion à l’hygiène des mains des professionnels de la santé [10, 11, 13, 21]. Cependant, pour ce faire, il est essentiel que les distributeurs de ces solutions soient disponibles sur toutes les unités de soins, accessibles au personnel et toujours remplis [22]. Toutes les participantes le mentionnent comme un des facteurs facilitant l’adhésion à l’hygiène des mains et plusieurs d’entre elles disent que si le distributeur de SHA est vide, il serait illusoire de croire qu’avant d’entrer dans la chambre d’un patient, alors que les infirmières sont déjà surchargées, ces dernières vont prendre le temps de chercher un distributeur qui soit rempli afin de pouvoir procéder à l’hygiène des mains. Ces deux éléments (accessibilité et disponibilité des SHA) se retrouvent dans une recension des études qualitatives effectuées entre 2000 et 2014 portant sur les facteurs qui influencent l’adhésion à l’hygiène des mains des professionnels de la santé [13] ainsi que dans les études de Kirk et al [23] et d’Atif et al [8]. Il est primordial que des distributeurs de SHA soient disponibles mais aussi facilement accessibles sur toutes les unités de soins [8, 23]. De plus, les gestionnaires ou autres personnes responsables devraient s’assurer que ces distributeurs soient toujours remplis [22]. En outre, il faudrait ajouter des lavabos pour que les infirmières puissent procéder à un lavage des mains avec de l’eau et du savon lorsqu’elles le jugent nécessaire lors des soins aux patients présentant une diarrhée associée au *Clostridium difficile* [24]. Selon nos résultats, l’adhésion à l’hygiène des mains est liée, entre autres facteurs, à la cohésion sociale, telle que décrite par Kwok [29], à l’intérieur d’une équipe de soins qui partage les mêmes valeurs ou le même but. Comme Kwok [29] le précise, il faut commencer par développer cette cohésion, si on veut augmenter les chances de réussir l’implantation locale de programmes visant l’amélioration de l’adhésion à l’hygiène des mains. Au-delà des interactions sociales entre les membres de l’équipe de soins, il faudrait mettre tout en œuvre pour permettre à chaque membre d’une équipe de soins de développer un sens d’engagement dans un projet commun.

Tout compte fait, nous sommes d’avis que l’apport de notre étude aux recherches existantes sur les interventions pour améliorer les taux d’adhésion à l’hygiène des mains des infirmières est d’avoir étudié deux équipes de soins plus performantes et d’avoir montré que des facteurs à plusieurs niveaux sont liés à cette meilleure performance. Basées sur nos résultats, nous suggérons que les interventions pour améliorer l’adhésion à l’hygiène des mains des infirmières ciblent les facteurs suivants: au niveau individuel – les connaissances, la protection personnelle et la conscience professionnelle; au niveau organisationnel – le leadership de l’infirmier(ère)-chef, la surveillance et une pratique collaborative; au niveau environnemental – la disponibilité, l’accessibilité des solutions hydro-alcooliques et des lavabos et au niveau socioculturel – une cohésion à l’intérieur de l’équipe de soins. Nous les proposons comme pistes de solutions tout en rappelant que des facteurs autres seraient à considérer dans divers contextes de soins.

**Limites de l’étude**

La doctorante en sciences infirmières était bien consciente que sa présence pouvait influencer la pratique de l’hygiène des mains et c’est pour cette raison que le but de la recherche a été élargi à toutes les mesures de prévention des infections. Une limite concerne le temps passé sur chacune des unités de soins. Avoir pu passer plus de temps (semaines, mois) sur les unités aurait éventuellement permis de dégager d’autres éléments. De plus, comme l’étude a été effectuée auprès d’équipes de soins d’un centre hospitalier universitaire francophone, il serait intéressant de procéder à de futures études auprès d’équipes de soins œuvrant dans un centre hospitalier anglophone afin d’y découvrir d’autres éléments liés à des taux élevés d’adhésion à l’hygiène des mains.

**CONCLUSION**

Nous devons poursuivre les efforts pour améliorer les taux d’adhésion à l’hygiène des mains des infirmières, ainsi que de tous les professionnels de la santé. Pour ce faire, une mobilisation continue est nécessaire au niveau clinique, organisationnel et social afin de soutenir les infirmières pour qu’elles soient en mesure de procéder à l’hygiène des mains et ainsi protéger les patients tout en protégeant leur santé. Les résultats de notre étude montrent que l’approche de la déviance positive est une méthode de recherche novatrice et intéressante qui peut contribuer à améliorer les connaissances au regard de l’hygiène des mains en étudiant des équipes de soins plus performantes et en apprenant de ces dernières.
RÉFÉRENCES


Handwash versus hand-rub practices for preventing nosocomial infection in hospital intensive care units: A systematic review and meta-analysis

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ABSTRACT:
Background: Compliance with handwashing in busy healthcare facilities, such as intensive care units (ICUs), is suboptimal and alcohol hand-rub preparations have been suggested to improve compliance. There is no evidence on the comparative effectiveness between handwash and hand-rub strategies. This systematic review was to assess the effectiveness of handwash versus hand-rub strategies for preventing nosocomial infection in ICUs.

Methods: Studies conducted in ICUs and indexed in PubMed comparing the clinical effectiveness and adverse events between handwash and hand-rub groups were included in a systematic review. The primary outcome was nosocomial infection rates. Secondary outcomes included microbial counts on healthcare providers' hands, mortality rates, patient/hospital cost of treatment of healthcare-associated infections (HCAIs), length of ICU/hospital stays, and adverse events. Studies were independently screened and data extracted by at least two authors. Meta-analyses of risk ratios (RR), incidence rate ratios (IRR), odds ratios (OR) and mean differences (MD), were conducted using the RevMan 5.3 software.

Results: Seven studies published between 1992-2009 and involving a total of 11,663 patients were included. Five studies (10,981 patients) contributed data to the ICU-acquired nosocomial infection rates. The pooled IRR was 0.71 (95% CI 0.61, 0.82; I² = 94%). On sensitivity analysis, pooled IRR was 0.39 (95% CI 0.32, 0.48; 4 studies; 8,247 patients; I² = 0%) in favour of hand rub. The pooled OR for mortality was 0.95 (95% CI 0.78, 1.61; 4 studies; 3,475 patients; I² = 39%). The pooled MD for length of hospital stay was -0.74 (95% CI -2.83, 1.34; 3 studies; 741 patients; I² = 0%). The pooled OR for an undesirable skin effect was 0.37 (95% CI 0.23, 0.60; 3 studies; 1504 patients; I² = 0%) in favour of hand rub. Overall quality of evidence was low.

Conclusion: Hand rub appeared more effective when compared to handwash in ICUs.

KEYWORDS
Nosocomial infection control; hand hygiene; intensive care units; healthcare-associated infection; hand washing; alcohol hand-rub preparations

INTRODUCTION
Nosocomial infections, or HCAIs are infections occurring in patients during the process of care in hospital or other healthcare facilities, which were not present or incubating at the time of admission[1]. HCAIs affect the quality of care and are the most frequent adverse consequence of healthcare worldwide[1]. Healthcare providers may also be affected by HCAIs, or may serve as vector/source of infection for HCAIs when they come into close contact with patients[1, 2].

About seven in 100 hospitalised patients in developed countries and 15 in 100 hospitalised patients in developing countries will acquire at least one HCAI[3, 4]. Patients admitted to intensive care units (ICU) and neonates are particularly at risk of acquiring HCAIs with over 30% of all patients admitted into ICU being affected by at least one HCAI in resource-constrained settings[3, 4]. The risk of infection in ICU is increased with length of stay and use of invasive devices such as central venous lines, urinary catheters and ventilators[4]. While urinary tract infection is the leading cause of HCAIs in high income countries, surgical wound infection is the most frequent HCAI in resource-poor settings[3, 4]. Data from the extensive work of the International Nosocomial Infection Control Consortium showed that device-associated nosocomial infection rates in ICUs were high in the Latin American countries[5-10]. For example, the overall device-associated rate was 29% in Brazil, 27% in Argentina and 24% in Mexico[8-10]. Rates in Poland...
and Turkey were 24%[11] and 34%[12] respectively, while rates in Asia and Middle East countries were generally lower than 10%[13-16], but higher than reported in the United States[17]. The mortality attributable to device-associated nosocomial infection ranged from 25% to 47% in Latin America[5, 6, 9], 4% to 43% in Asia and the Middle East[13-15], and were as high as 75% in Morocco[18]. HCAIs are the most frequent adverse consequence of unsafe patient care affecting both high income and resource-constrained settings.

HCAIs exert considerable strain on healthcare resources especially the health workforce. They increase economic costs in treatments and unnecessary prolongation of patient hospital stays[6, 9, 12-15, 18-20]. Billions of dollars are expended annually in the treatment of HCAIs and attendant disabilities worldwide[20]. Prolonged patient hospital stay due to HCAIs in Europe alone is estimated at 16 million extra days per year[20]. A cost analysis of patients admitted into the ICU of a hospital in Brazil showed a ten-fold increase in the median cost of hospitalization per patient and a five-fold increase in the length of hospital stay among patients who acquired an HCAI compared to patients who did not[21]. Similar analysis of extra mean cost per patient incurred in treating central-line associated bloodstream infections in hospital ICU reported 5,000, and 11,500 US dollars in Argentina, and Mexico respectively[22, 23].

Hand hygiene has been considered to be the most effective tool in HCAIs control ever since Ignaz Philipp Semmelweis observed its immense effect on the reduction of incidence of childbed fever[24]. Vigorous handwashing for 40-60 seconds, or the use of alcohol hand rub before and after every patient contact is recommended to prevent transmission of pathogenic organisms from one patient to the other[1]. Compliance is, however, often suboptimal in most resource-constrained settings because of limited infrastructure, a substantial workload and skin reactions to handwashing products[1]. Hand rub with alcohol is fast and may therefore improve compliance to hand hygiene recommendations in these settings[1], although, handwashing is indicated exclusively in certain instances, such as when the hands are visibly soiled. Although, hand rub has been recommended to improve compliance with hand hygiene recommendations[1], there is no synthesised evidence in clinical practice to demonstrate that hand-rub practices are as effective as handwash practices in preventing HCAIs. Thus, the aim of this systematic review is to compare the clinical effectiveness of handwash with hand-rub practices in preventing HCAIs in hospital ICUs.

METHODS
The study is a systematic review registered in PROSPERO with ID CRD42019119112 and was prepared according to the recommendations of the PRISMA statement[25].

Study eligibility
We included all study types, which compared handwash (with detergent or antiseptic) with hand-rub (with alcohol) strategies, provided they were conducted in an ICU in the review. Study groups with hand-rub strategies which permitted intermittent use of handwash for visibly soiled hands were also included because we recognised that such practices do occur in the real world. However, the number of handwash in the hand-rub group must be infrequent and insignificant when compared to the wholly handwash group. Studies could enrol patients of any age group admitted into an ICU, could be any type, including medical, surgical, neonatal or other. Studies that assessed outcomes among healthcare providers involved in ICU patients’ care were also included. The primary outcome for the systematic review was HCAI rates. Secondary outcomes included microbial counts on healthcare providers’ hands, mortality rates, patient/hospital cost of treatment of HCAIs, length of ICU/hospital stay, and adverse events of the hand hygiene agents used.

Search strategy and screening
A search was conducted in PubMed. A sensitive search strategy was implemented using the core search strings, which included elements of (handwash* OR hand rub*) AND (hand hygiene agents) AND (outcomes) (Appendix). Screening of abstracts and titles was done in two stages. Two authors independently screened the abstracts and titles to select potentially relevant papers. A third author harmonised and confirmed eligibility of outputs from the first stage of screening and discussed doubts with a fourth author. Full texts of potentially eligible studies were retrieved and further assessed for eligibility.

Data extraction
A piloted data extraction form was used to extract data from included studies. Data was extracted by one author and checked by a second author. Data extracted included background study characteristics such as study reference, country where study was conducted, and study duration. Further detailed data extracted included a description of study design, sample size, country where study was conducted, study duration, study population, type of ICU, interventions conducted in study group(s), risk of bias (items from the Cochrane risk-of-bias tool such as method of randomisation), allocation concealment and type of blinding. Data was also extracted on whether study groups were comparable in terms of loss to follow-up and whether all participants were included in the analysis. Study outcomes corresponding to the pre-specified per-protocol outcomes were extracted for each study group. For dichotomous outcomes, number of events and the total for each study group were extracted. For measurement scale outcomes, the mean and standard deviation (SD) were extracted and if they were not provided, then the median and interquartile range (IQR) were used. Rates in person-time of follow-up were extracted and when not available, the total person-time of follow up and the number of events were extracted.

Data synthesis
Data was analysed using the RevMan 5.2 software. Dichotomous outcomes, for example, mortality was presented as risk ratio (RR) with the hand-rub set as the experimental group and the handwash set as the control group. One study presented the mortality per 1,000 patient-days, but did not report the number of deaths, or the
person-time of follow-up, hence this data was excluded. The number of deaths for each study group from the death rate and the total person-time of follow-up given per group were calculated. Measurement scale outcomes were presented as mean difference (MD). In one study where only median and IQR were reported, the mean and SD for each group were estimated. The person-time outcome of the rate of HCAI was presented as incidence rate ratio (IRR). The standard error for the natural log of IRR was calculated using the formula √(1/e1 + 1/e2) where √ is square root and e1 is the number of event in Group 1 and e2 is the number of event in Group 2[26]. For all pooled analysis, we noted the direction of outcomes because the RevMan software by default recognises a higher number of events or a higher measurement as unfavourable. However, all outcomes were aligned with the default setting of the software.

For dichotomous outcomes, ORs were pooled. For measurement scale outcomes, MDs were pooled and for person-

### TABLE 1: Characteristics of reviewed studies

<table>
<thead>
<tr>
<th>Study ID</th>
<th>Design</th>
<th>Sample size</th>
<th>Country</th>
<th>Type of ICU</th>
<th>Study population*</th>
<th>Handwash system</th>
<th>Hand-rub system</th>
<th>Trial duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capretti 2008[31]</td>
<td>Before-after trial design</td>
<td>175</td>
<td>Italy</td>
<td>Neonatal ICU</td>
<td>Patients only</td>
<td>Plain fluid detergent 0.5% triclosan</td>
<td>Antiseptic detergent preparation 4% chlorhexidine gluconate and alcohol-based hand rub containing 62% denatured ethyl alcohol**</td>
<td>16 months before; 16 months after</td>
</tr>
<tr>
<td>Doebblenig 1992[32]</td>
<td>Cluster-crossover design</td>
<td>1,894</td>
<td>USA</td>
<td>Adult critical care; Surgical ICU; Medical ICU; cardiovascular ICU;</td>
<td>Patients and healthcare providers</td>
<td>4% solution of chlorhexidine gluconate</td>
<td>60% isopropyl alcohol hand-rising agent**</td>
<td>Eight months; mean hospital stay 3.4 days</td>
</tr>
<tr>
<td>Girou 2002[33]</td>
<td>RCT parallel group design</td>
<td>23</td>
<td>France</td>
<td>Surgical and medical ICU</td>
<td>Healthcare providers only</td>
<td>Medicated soap; 4% chlorhexidine gluconate</td>
<td>45% 2-propanol, 30% 1-propanol, 0.2% mecetronium ethyl sulphate</td>
<td>Daily session until target activities were met</td>
</tr>
<tr>
<td>Ng 2004[36]</td>
<td>Observational design with historical control</td>
<td>337</td>
<td>Hong Kong</td>
<td>Neonatal ICU</td>
<td>Patients only</td>
<td>chlorhexidine gluconate 4%</td>
<td>1% chlorhexidine in isopropyl alcohol and ethyl alcohol plus disposable but non-sterile gloves for routine non-invasive procedures</td>
<td>Three years before; three years after</td>
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<tr>
<td>Larson 2001[34]</td>
<td>RCT parallel group design</td>
<td>50</td>
<td>USA</td>
<td>Surgical ICU; Medical ICU</td>
<td>Healthcare providers only</td>
<td>2% chlorhexidine gluconate containing traditional antiseptic wash</td>
<td>Waterless hand rub containing 61% ethanol with emollients**</td>
<td>Four weeks</td>
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<tr>
<td>Souweine 2009[37]</td>
<td>Before-after trial design</td>
<td>350</td>
<td>France</td>
<td>Multicentre adult ICUs</td>
<td>Patients and healthcare providers</td>
<td>Either 4% chlorhexidine gluconate or 4% povidone iodine</td>
<td>45% isopropanol (2-propanol, 30% 1-propanol, and 0.2% mecetronium ethyl sulfate**</td>
<td>Four months before; Two months washout; Four months after</td>
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<tr>
<td>Lucet 2005[35]</td>
<td>Before-after trial design</td>
<td>7,994</td>
<td>France</td>
<td>Infectious disease ICU; Medical ICU; Surgical ICU</td>
<td>Patients only</td>
<td>Antiseptic soap</td>
<td>Alcohol-based hand rub**</td>
<td>Five years before; 16 months after</td>
</tr>
</tbody>
</table>

*Study population varied depending on outcomes assessed. For example, HCAI in patients and skin reaction in healthcare providers

**Additional provision for soap washing of visibly soiled hands
time outcome, IRR was pooled. A fixed-effect model was adopted to pool outcomes from studies. Where there was a moderate to considerable statistical heterogeneity, this was investigated further by conducting a sensitivity analysis. Forest plots were used to summarise analyses. For outcomes that could not be pooled due to differences in assessment modalities between studies, a narrative synthesis was adopted to present the results.

RESULTS
The PubMed search conducted on March 21, 2018 (Appendix A), identified 706 abstracts from which 11 potentially eligible full texts were retrieved (Figure 1). Four full-text articles were excluded because two[27, 28] were conducted in regular hospital wards and not ICUs, one[29] had handwashing conducted in both groups in a similar way, while one study [30] was a hypothetical model that did not involve real-world data (Appendix B).

The sample sizes for the included studies[31-37] ranged between 23-7,994, published between 1992-2009 and involved a total of 11,663 participants. Three studies were conducted in France, two in the USA, one each in Italy and Hong Kong (Table 1). Study designs varied. Six were trials with different designs, while one was a retrospective observational design with historical control (Table 1). Two studies were carried out in neonatal ICUs, and five involved two or more types of ICUs, including surgical, medical, cardiovascular, and infectious diseases ICUs. Three studies enrolled patients only, two studies enrolled patients and healthcare providers, while two enrolled healthcare providers only. Chlorhexidine solution was used for handwashing in five studies, one study used triclosan, while one only mentioned “antiseptic soap” without stating the content. For the hand-rub groups, all were alcohol-based. Three studies contained alcohol only, two contained chlorhexidine in addition to alcohol, while two contained...
mecetronium ethyl sulphate. In five of the studies, there were additional provision for occasional handwashing when hands were visibly soiled. The study durations ranged from a period of four weeks to five years.

**PRIMARY OUTCOME**

**ICU-acquired HCAI rates**
Five studies (10,981 patients) contributed data to the ICU-acquired HCAI rates. The pooled IRR was 0.71 (95% confidence interval, CI: 0.61 to 0.82), $I^2 = 94\%$ (Figure 2). Thus, on average, there was a 29% reduction in the rate of HCAI with the hand-rub strategy. However, the heterogeneity was considerable. Further investigation showed the heterogeneity was due to the qualitatively different study by Doebbeling et al [32] whose effect size was in favour of the handwash strategy. The study was less recent than the other four, and compliance with hand hygiene practices was found to be significantly higher in the handwash group compared to the hand-rub group. In a sensitivity analysis excluding this study, the pooled IRR for the remaining studies (four studies, 8,247 patients) was 0.39 (95% CI 0.32, 0.48), $I^2 = 0\%$ (Figure 3).

**SECONDARY OUTCOMES**

**Mortality**
Four studies (3,475 patients) contributed data to the mortality outcome. The pooled OR was 0.95 (95% CI 0.78, 1.16) $I^2 = 39\%$ (Figure 4). Hence there was no significant difference in mortality between the two strategies and results had moderate heterogeneity. For consistency, the mortality outcome after excluding the Doebbeling et al study was also explored. The analysis (three studies, 741 patients) showed a pooled OR for mortality of 0.54 (95% CI 0.31, 0.93) $I^2 = 0\%$ (Figure 5) hence a 46% reduction in the odds of dying from the use of the hand rub. The sensitivity analysis removed all the statistical heterogeneity.
Length of ICU stay

Four studies (3,475 patients) reported data on length of ICU stay. However, one did not report a measure of the variability for the mean. Thus, three studies (741 patients) were analysed for this outcome and they found a non-significant pooled MD -0.74 (95% CI -2.83, 1.34) days I² = 0%, in favour of the hand-rub strategy (Figure 6).

Healthcare providers hand microbiology

Three studies[32-34] (650 participants) assessed healthcare providers’ hands for microorganism carriage. This variable was assessed differently by each study and therefore could not be pooled in a meta-analysis. Doebbeling et al [32] reported an average of 2.25 and 2.51 micro-organisms carriage per pair of hands in the handwash and hand-rub groups respectively. Girou et al, [33] assessed percentage reduction in the bacterial count and reported a difference between groups of 26% in favour of the hand-rub strategy. Larson et al, [34] assessed hand microbial counts in colony-forming units (CFU), but found no statistically significant difference between the handwash and the hand-rub groups when comparing change in CFU versus baseline.

Adverse events

Three studies (1,504 participants)[32, 34, 37] assessed adverse skin reactions in the use of hand agents. Two studies reported the total number of undesirable skin effects and these were pooled in a meta-analysis. The pooled OR of an undesirable skin condition was 0.37 (95% CI 0.23, 0.60) I² = 0%. Thus, on average, the use of the hand-rub strategy reduced the odds of an undesirable skin effect by about 63%.

One study (50 participants) [34] adopted the visual skin scaling (VSS) and the hand skin assessment (HSA). For both scales the higher the score, the better is the skin condition. Both the VSS and the HSA reported statistically significant difference in means in favour of the hand-rub strategy.

STUDY QUALITY

Only one study was a randomised controlled trial and used adequate means of allocation concealment [33] The same study adopted a blinded outcome assessment. One study [37] was deemed to have a degree of high risk of attrition bias because more than 10% of the study population was not accounted for in the outcome results. Thus, the overall quality of evidence was deemed to be low.

DISCUSSION

Main findings

The primary study outcome showed that hand-rub strategy significantly reduced the risk of HCAI in the ICU by at least 29%. The reduction in risk was much higher at about 61% on average when the source of heterogeneity was eliminated. The sensitivity analysis also showed that hand-rub strategy reduced the odds of mortality by about 46% on average with no heterogeneity between studies, although the primary analysis showed no difference in mortality when there was moderate heterogeneity. The evidence, however, did not show a significant effect on length of stay in the ICU. One study further showed that the hand-rub strategy significantly reduced bacterial count on health workers’ hands by about 26% on average, while another study found no difference between strategies in a similar hand microbiology assessment. The odds of an undesirable skin condition after use of the hand-hygiene strategy was also significantly reduced with the use of the hand-rub strategy by about 63% on average compared to use of the handwash strategy.

Strengths and weaknesses

The search was limited to only journals indexed in PubMed thus, there was a possibility of missing studies that had not been indexed in PubMed. However, any missing study may likely only have impact on the quantitative average, and not on the qualitative direction of effect. This is because all outcomes in the meta-analyses were consistently in favour of the hand-rub strategy in the qualitative direction of effect. This is the first study to synthesize the comparative evidence for the clinical effectiveness of the hand-rub strategy for preventing HCAs in ICUs even though several guidelines had recommended the use of this strategy to improve compliance with hand hygiene recommendations[1]. The evidence included a fairly large population of patients, which improved the robustness and

<table>
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<tr>
<th>Study or Subgroup</th>
<th>Hand-rub</th>
<th>Handwash</th>
<th>Weight</th>
<th>Risk Ratio IV, Fixed, 95% CI</th>
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<tr>
<td>Capretti 2008</td>
<td>Mean</td>
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<td>Mean</td>
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<tr>
<td></td>
<td>51</td>
<td>27</td>
<td>80</td>
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<td>Ng 2004</td>
<td>77.7</td>
<td>45.2</td>
<td>176</td>
<td>79</td>
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<tr>
<td>Souweine 2009</td>
<td>7.9</td>
<td>85</td>
<td>143</td>
<td>8.5</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>399</td>
<td></td>
<td>342</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Heterogeneity: Chi²=0.25, df=2 (P=0.88); I²=0%
Test for overall effect: Z=0.70 (P=0.48)

FIGURE 6: Meta-analysis of mean difference in days for length of ICU stay of handwash vs. hand-rub strategy
precision of the meta-analyses results. One study with significant contamination of the hand-rub strategy with handwashing was excluded thus, the differential effect sizes may only be attributable to the difference in hand-hygiene strategies employed. The study has also not taken cognisance of within-study infection types. This is a common within-study variable to both handwash and hand-rub strategies.

Some variables may become important considerations considering the uncertainty around the randomisation of study participants in included studies. These may account for some of the differences in baseline susceptibilities to infection and the response to hand-hygiene practices. Some ICUs may not be comparable in terms of the rate of care contacts, for example, neonatal ICUs are expected to have higher rate of care contacts compared to adult ICUs. Similarly, surgical ICU patients may have a higher risk of infection compared to medical ICU patients. The frequency of hand hygiene may also influence HCAI rates and healthcare providers’ skin conditions. Only one included study reported a significantly greater compliance with hand-rub strategy, but it is unclear whether the greater compliance with hand rub may partly or wholly account for differences in effect estimates between both strategies. Alcohol hand rubs appear generally friendlier to the hands compared to hand washing with soap and water. This could therefore, be a driver for compliance rather than a consequence of use.

**Mechanisms**

The findings from our study may be mediated through differences in the level of compliance with the hand-hygiene strategies. This was supported by the only study that showed a qualitatively different clinical effect on the HCAI rate, in favour of handwash strategy, thus causing significant statistical heterogeneity. The study assessed the level of compliance with hand-hygiene instructions, and found that it was significantly higher in the handwash group compared to the hand-rub group. However, the other studies included in the analysis did not assess compliance as an outcome thus, the postulation could not be investigated further. Studies suggest that handwashing with detergents or antiseptics generally require longer time than hand-rub practices[1, 30, 37, 38]. Therefore, the general consensus is that hand-rub may improve compliance in most cases especially in overloaded and busy healthcare settings. A Cochrane review of interventions to improve hand-hygiene compliance in patient care examined whether an increase in hand hygiene compliance could reduce rates of HCAIs. The review concluded that there was a lack of reliable evidence[39] to determine whether there was a clear effect.

The clinical effectiveness of the hand-rub strategy may also be partly explained by differences in the hand-rub agents. While all handwash preparations contained only one antiseptic, five of the seven included studies contained antiseptic in addition to the alcohol. Thus, there may be a synergistic protective effect of the antiseptic and the alcohol in hand-rub preparations. The number of studies were few, and therefore, did not allow for subgroup analysis by the number or type of antiseptic contained in the hand-hygiene preparations, or the type of ICUs where studies were conducted.

**Implications**

Findings from our study suggest that hand-rub strategies may be more effective than handwash strategies by acting through compliance. Improved compliance may be mediated through several factors, one of which could be favourable health workers’ hand conditions demonstrated by reduced odds of a skin reaction with the use of hand-rub strategies. This suspicion, however, requires further study.

**CONCLUSION**

Our study demonstrated that hand rub appeared to be more effective than handwash as a hand-hygiene strategy, albeit with low-to-moderate quality evidence. This strategy supports the use of the hand-rub strategy in ICUs for positive clinical outcomes in patients and healthcare providers.

**REFERENCES**


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