Objective: Inadequate infrastructure and lack of alcohol-based handrub (ABHR) are significant barriers to hand hygiene practices, especially in resource-limited settings. Between 2006 and 2008, the World Health Organization (WHO) developed and tested two alcohol-based handrub (ABHR) formulations for hand antisepsis suitable for local production in healthcare facilities (HCFs). We investigated the feasibility, advantages, costs and barriers related to the local production of the WHO-recommended ABHR formulations worldwide.

Methods: In 2011, we conducted an online survey based on a previously pilot-tested questionnaire including 58 questions related to the WHO formulation preparation and storage, ingredient and dispenser procurement, quality control, tolerability, acceptability, and promotion. One hundred and twenty five potential local producers of the WHO formulations were identified through the WHO networks and contacts and invited to participate.

Results: Among 100 respondents to the invitation (80%), 56 were not currently producing the WHO formulations, 4 did not wish to participate, and 1 was excluded due to incomplete data. Thirty-nine sites (34 HCFs and 5 private companies) from 29 countries (7 low-, 16 middle-, and 6 high-income economies) were included in the final data analysis. In all 39 sites the WHO formulation local production proved feasible, using locally sourced alcohol in 72% of sites, and with 54% replacing a previously used ABHR. Product tolerability and acceptability was excellent in 82% of sites and its use was promoted as part of a multimodal strategy in 88%. Cost evaluation was possible in 16 sites and showed WHO formulations to be less expensive than marketed products. Improvement is required for quality control, tolerability, and acceptability, and promotion.

Discussion: Local production of WHO ABHR formulations proved feasible and provides an acceptable and excellently tolerated solution particularly suitable for low- and middle-income countries as an alternative to unavailable or unaffordable commercially-produced ABHR.

As confirmed by previous research, the promotion of WHO ABHR as a multimodal approach by most HCFs in our study most likely contributed to enable improvement in hand hygiene practices and related reduction in incidence of hospital acquired infection.3 Large scale commercial local production contracted by governments or available for purchase on private local markets are an exciting prospect which potentially reduce product cost due to lower import-associated costs of scale.


The Table illustrates advantages of and barriers to local production identified through the survey.

Table 1. Local production of the World Health Organization (WHO)-recommended alcohol-based handrub (ABHR) formulations: advantages and potential barriers

| Advantage/Barrier          | Number of sites/Total (%)
|----------------------------|--------------------------
| Ease of production         | 35/36 (95)               |
| Tolerability               | 72/39 (187)              |
| Acceptability              | 30/37 (81)               |
| Reliability                | 27/38 (71)               |
| Improved post roll         | 29/39 (74)               |
| Less expensive              | 30/39 (76)               |
| Produced ABHR              | 29/39 (74)               |

Lack of equipment available to perform quality control 11/24 (46)  
Lack of equipment available to perform quality control 11/24 (46)

Main results:  
• WHO formulation local production proved feasible in all 39 sites.  
• Locally sourced alcohol was used in 72% of sites, either sourced from the chemical industry (53%) or from the agroindustry (47%) e.g. sugar cane, corn, maizic, mahogany and walnut.  
• Product tolerability and acceptability were excellent in 82% of sites.  
• Quality control was performed by 85% of sites and 4 countries lacked access to equipment required for quality control.  
• WHO/ABHR was promoted as part of a multimodal strategy in 88% of sites.  
• Reliable cost evaluation (16 sites) showed WHO formulations to be less expensive than marketed products.

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