P1238

Alcohol-based hand rubs fulfil EN 1500 in 15 seconds

Erika Mönch[1], Viktoria Kolbe[2], Heide Niesalla[2], Christoph Senges[2]
[1]BODE Chemie GmbH, a company of the HARTMANN GROUP, Hamburg, Germany
[2]HARTMANN SCIENCE CENTER, BODE Chemie GmbH, a company of the HARTMANN Group, Hamburg, Germany

Introduction

Hand hygiene is considered the most important hygiene measure to prevent healthcare-associated infections [1]. For hygienic hand antisepsis, alcohol-based hand rubs (ABHRs) are used to inactivate the transient flora. The efficacy of professional ABHRs is systematically assessed through standardised tests like EN 1500:2013 with a pre-defined rubbing technique and a specific application time [2]. In clinical practice, however, application should be as simple and quick as possible. Complex instructions recommending the application of at least 3 mL in 30 seconds using a pre-defined technique are seen as a barrier and lead to reduced hand hygiene compliance [3,4]. Alternative rubbing techniques that do not sacrifice safety for simplicity, such as "responsible application", have been shown to provide comparable skin coverage and may be superior in clinical practice. As HCWs also struggle with the time requirements of hand hygiene [4], reducing application times from 30 to 15 seconds may improve adherence without compromising efficacy [3,4].

To pave the way for simpler and faster ABHR application, we investigated whether ethanolic and propanolic hand antiseptics can meet the unmodified efficacy requirements of EN 1500 in 15 seconds instead of 30 seconds using "responsible application"* and/or the standard rubbing procedure according to EN 1500.

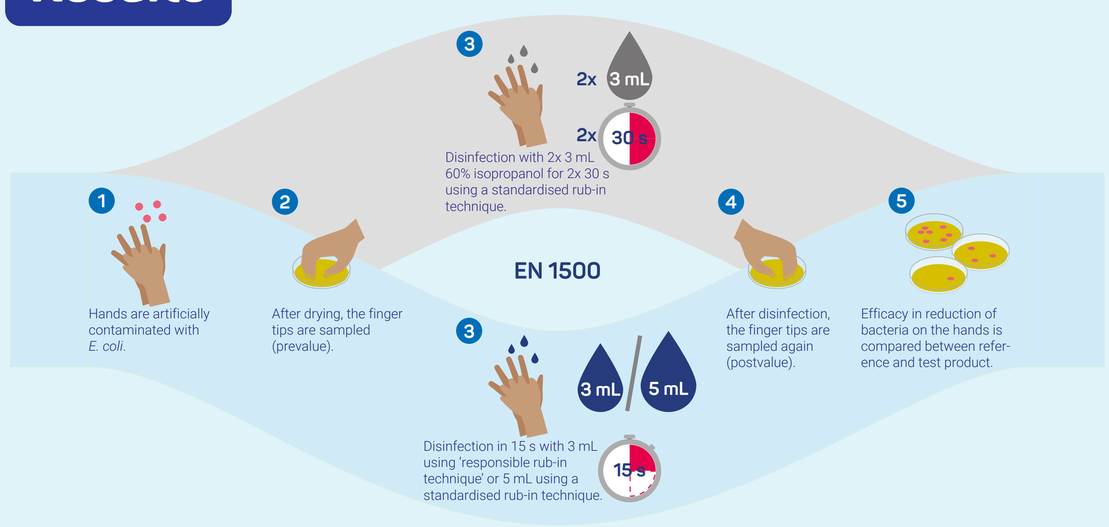
Method

Efficacy testing according to EN 1500:2013 [2] was performed by an independent laboratory accredited according to EN ISO/IEC 17025. In brief, in a cross-over design, volunteers' hands were contaminated with ***E. coli*** and disinfected with an ABHR or the reference (60% (w/w) isopropanol). Hands were kneaded in culture medium with a neutraliser before and after disinfection to count colony forming units (CFU). Log_{10} reduction rates as well as non-inferiority of the tested ABHRs were determined. While rubbing times of 15 seconds were tested with an ethanolic hand rub (85% (w/w) ethanol) and a propanolic hand rub (45% (w/w) propan-2-ol, 30% (w/w) propan-1-ol) (both BODE Chemie GmbH, a company of the HARTMANN GROUP, Hamburg, Germany), the reference procedure (2 x 3 mL for 2 x 30 s with a defined rubbing technique) was not modified.

First, a pre-test was conducted with 10 volunteers to determine the amount of both ABHRs required to meet the efficacy requirements of EN 1500 in 15 s using "responsible application", a rubbing method with no predefined steps [5].

Second, both ABHRs were tested with 3 mL and responsible application as well as 5 mL and the application technique defined by EN 1500 in a test with 20 volunteers. All 20 volunteer efficacy tests met the EN 1500 acceptance criteria.

Results



Volume pre-test

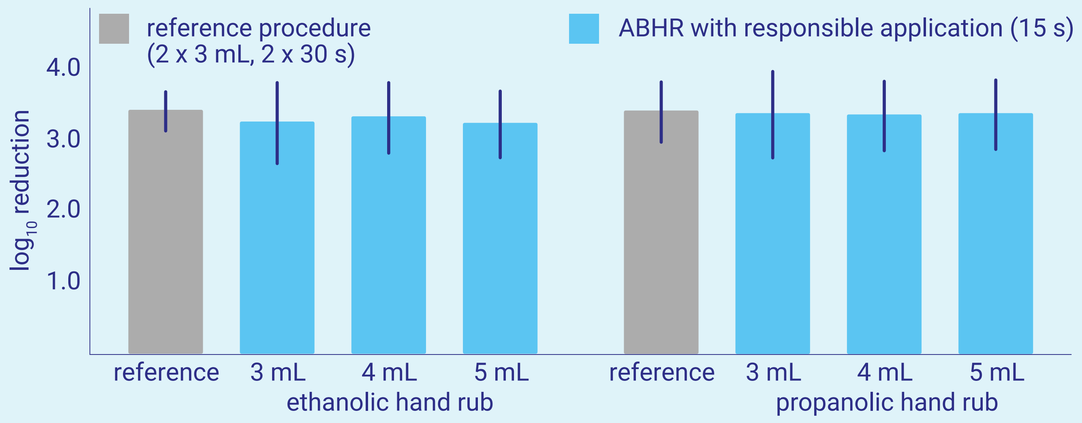


Figure 1: Volume-dependent log_{10} reduction by two ABHRs in 15 seconds.
Shown are means (columns) and standard deviations (error bars) of log_{10} reductions according to a modified EN 1500 with 10 volunteers. Ethanolic and propanolic ABHRs were tested using 3 mL to 5 mL in 15 seconds using responsible application (blue). The reference method (grey) was not modified from EN 1500. With log_{10} reductions of 3.44 and 3.40 for the references and 3.25 to 3.36 for the ABHRs and volumes tested, there were only minor differences between the volumes tested or in comparison with the references. Therefore, 3 mL was chosen as the smallest and most convenient volume for subsequent tests.

EN 1500 in 15 s

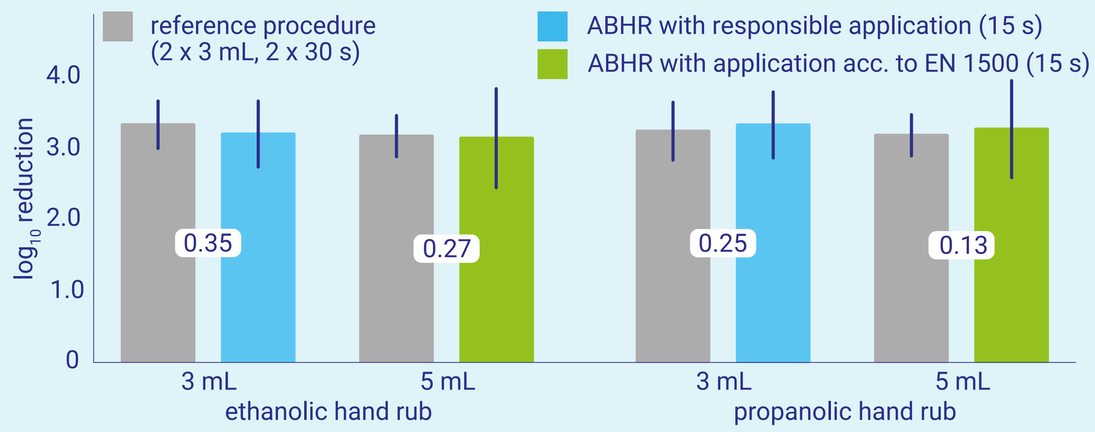


Figure 2: EN 1500 in 15 seconds using two hand rubs and two rubbing techniques.
Shown are means (columns) and standard deviations (error bars) of log_{10} reductions in tests according to EN 1500 with 20 volunteers as well as Hodges-Lehman confidence limits (numbers in white boxes). Ethanolic and propanolic ABHRs were used in 15 seconds, using responsible application with 3 mL (blue) or application according to EN 1500 with 5 mL (green). The reference procedure (grey) was not modified. For all references and ABHRs, log_{10} reductions ranged from 3.17 to 3.33. For both ABHRs and application techniques, the Hodges-Lehmann confidence limits were less than 0.6, confirming non-inferiority in 15 seconds.

Conclusion

In clinical practice, application times are usually shorter than the often recommended 30 seconds, with physicians using 8.5 seconds on average [6]. But shorter application times are not necessarily disadvantageous: under controlled conditions, hand coverage in 15 seconds is equivalent to 30 seconds [7]. Pires *et al.* showed that reduction of bacterial CFUs after 10 to 20 seconds of hand antisepsis was not significantly different from that after 30 seconds or more [8].

Our work demonstrates that both ethanolic and propanolic ABHRs can ensure microbial safety with responsible application in 15 seconds. This optimises the process for practical use and removes additional barriers to user-friendly application.

* rub-in technique without specific order or steps with focus on complete coverage of hands as well as fingertips and thumbs.

References

[1] Hauer T, Dettenkofer M. Epidemiologie und Prävention von nosokomialen Infektionen. Pädiatrie 2014;25:820–841.
[2] DIN EN 1500:2013: Chemical disinfectants and antiseptics - Hygienic handrub - Test method and requirements (phase 2/step 2). 2013.
[3] Harnoss JC, *et al.* Hand antisepsis without decreasing efficacy by shortening the rub-in time of alcohol-based handrubs to 15 seconds. J Hosp Infect 2020;104:419–424.
[4] Kramer A, *et al.* Shortening the Application Time of Alcohol-Based Hand Rubs to 15 Seconds May Improve the Frequency of Hand Antisepsis Actions in a Neonatal Intensive Care Unit. Infect Control Hosp Epidemiol 2017;38:1430–1434.
[5] Kampf G, *et al.* Influence of rub-in technique on required application time and hand coverage in hygienic hand disinfection. BMC Infect Dis 2008;8:149.
[6] Stahmeyer JT, *et al.* Hand hygiene in intensive care units: a matter of time? J Hosp Infect 2017;95:338–343.
[7] Paula H, *et al.* Wettability of hands during 15-second and 30-second handrub time intervals: A prospective, randomized crossover study. Am J Infect Control 2018;46:1032–1035.
[8] Pires D, *et al.* Hand hygiene with alcohol-based hand rub: how long is long enough? Infect Control Hosp Epidemiol 2017;38(5):547-52.

Conflict of Interest

The authors are employees of BODE Chemie GmbH, a company of the HARTMANN Group, which is a manufacturer and vendor of disinfectants.