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PRACTICE FORUM

# Three-year sustainability of alcohol-based hand rub use increase in Finnish long-term care facilities

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## Abstract

Long-term care facilities (LTCFs) may serve as a reservoir for multi-resistant bacteria. Hand disinfection with alcohol-based rubs is a simple tool for controlling cross-contamination between patients and preventing healthcare-associated infections. Our aim was to promote the use of alcohol-based hand rubs.

A multidisciplinary team (an infectious disease consultant, an infection control nurse, and a geriatrician) visited all LTCFs (n=123) for elderly persons in the Central Finland Healthcare District (population 265 000) between September 2004 and October 2005. In each unit, head nurses and often also general practitioners answered structured questions concerning the monthly amount of alcohol-based hand rubs used in liters and patient-days. The facility environment was evaluated, especially the opportunities for hand disinfection and new locations for additional hand rub containers were proposed. During 2006-2008, three postal surveys including feedback were conducted annually.

A total of 119 units with around 3500 residents participated in all four steps (a site visit and three postal surveys). The total amount of hand rub used increased by 70%, from the mean (SD) of 7.3 (5.1) liters/1000 patient days on the baseline visit to 12.4 liters (14.9) in 2008.

The multidisciplinary team succeeded in promoting hand hygiene in LTCFs, which was sustained over the three-year follow-up.

## Key words

HAND-*microbiology*; HANWASHING-*methods*; HYGIENE; ETHANOL-*pharmacology*, LONG TERM CARE

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## Introduction

Increasingly, antimicrobial resistance is a problem in long-term care facilities (LTCFs) worldwide.[1-4] LTCF residents may be an important reservoir for multi-resistant organisms such as methicillin-resistant *Staphylococcus aureus* (MRSA) and extended-spectrum beta-lactamase (ESBL) producing Enterobacteriaceae.[5-6] Hand hygiene is the most important means of preventing healthcare-associated infections and transmission of multi-resistant bacteria.[7]

## Background

In Finland, to comply with the Communicable Disease Law, revised in 2004, all healthcare settings should have nosocomial infection prevention and control programs. Infection control teams at the district level have a consulting role in these activities. In practice, not all healthcare settings have sufficient in-house expertise in infection control issues. This is especially evident in such new settings as sheltered housing and dementia units.

Although antimicrobial resistance in Finland is less than in central and southern Europe, the situation has been deteriorating as it has elsewhere.[8] An emerging problem of MRSA in Finnish LTCFs has already been documented, starting in 2001.[9-11] In the Central Finland Healthcare District, the number of new MRSA and ESBL cases in LTCFs has also been on the rise. This prompted the district's infection control team to visit all LTCFs to investigate the characteristics of each unit and to give advice on hand hygiene. The primary aim of this study was to promote the use of alcohol-based hand rub. Previously, we reported that one year after the visits there was an increase in the use of alcohol-based hand rubs.[12] Herein we describe how practice was sustained over the following two years.

## Methods

In Finland (population 5.3 million), the national healthcare system is organized into twenty geographically and administratively defined healthcare districts, with populations ranging from 67,800 to 1.7 million. The Central Finland Healthcare District (population 265,000) consists of 28 local municipalities. At the municipality level, healthcare centers run by local general practitioners provide primary care. Healthcare center hospitals have both short-term and long-term beds. In addition, long-term care for the elderly is provided by nursing homes, dementia units, or sheltered housing, depending on the patient's physical, psychiatric, and behavioral condition. Secondary care is primarily provided by the central hospital, which has its own infectious disease consultant, a couple of infection control nurses, and a small geriatric unit.

Between September 27, 2004, and October 3, 2005, a team comprising an infectious disease consultant (MR), an infection control nurse (AJ) and a geriatrician (PK) visited all units that provide long-term care for elderly persons in the Central Finland Healthcare District. In each unit, head nurses and often also general practitioners answered structured questions concerning patient populations and monthly use of alcohol-based hand rubs in liters. The facility environment was evaluated. New locations for additional hand-rub containers were proposed.

Annually after the last site visit, on October 3, 2006, 2007, and 2008, the head nurse of each unit responded to a postal questionnaire which requested information on patients and the use of alcohol-based hand rubs in liters during the preceding month, MRSA and ESBL carriers and patients with urinary catheters. Every year the results of the postal survey were sent to the units.

## Statistical analysis

The data are presented as means with standard deviations (SD) or as counts with percentages. The most important outcomes are given with 95 per cent confidence intervals (95% CI). Bootstrap type regression analyses or logistic regression analysis clustered by the type of setting were used to analyze the longitudinal data.

The study protocol was approved by the Ethics Committee of the Central Finland Healthcare District.

## Results

A total of 119 units with an average 3455 residents (Table I) participated in all steps (the baseline visit and three postal surveys); 25 healthcare center hospitals, 29 nursing homes, 10 dementia units, and 55 sheltered care units. In healthcare center hospitals, approximately half the patients were in long-term care; in other settings, this figure was 90% or more. Over 90% of patients were 65 years of age and 69% were

**Table I. Characteristics of patients by type of setting**

| | Baseline visits | | | Postal surveys |
|---|---|---|---|---|
| | **2005** | **2006** | **2007** | **2008** |
| **Health care centre (N=25)** | | | | |
| Number of patients | 1100 | 1069 | 1058 | 1039 |
| MRSA carriers, n (%) | 7 (0.6) | 20 (1.8) | 17 (1.6) | 13 (1.3) |
| ESBL carriers, n (%) | 11 (1.0) | 8 (0.7) | 15 (1.4) | 20 (1.9) |
| Urinary catheters, n (%) | 56 (5.1) | 77 (7.2) | 82 (7.8) | 84 (8.1) |
| **Nursing homes (N=29)** | | | | |
| Number of patients | 1080 | 1096 | 1069 | 1039 |
| MRSA carriers, n (%) | 12 (1.1) | 31 (2.8) | 27 (2.5) | 13 (1.3) |
| ESBL carriers, n (%) | 4 (0.4) | 7 (0.6) | 9 (0.8) | 9 (0.9) |
| Urinary catheters, n (%) | 24 (2.2) | 28 (2.6) | 28 (2.6) | 31 (3.0) |
| **Dementia units (N=10)** | | | | |
| Number of patients | 141 | 115 | 126 | 119 |
| MRSA carriers, n (%) | 0 (0) | 0 (0) | 0 (0) | 2 (1.7) |
| ESBL carriers, n (%) | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| Urinary catheters, n (%) | 0 (0) | (0) | 1 (0.8) | 1 (0.8) |
| **Sheltered care units (N=55)** | | | | |
| Number of patients | 1176 | 1151 | 1200 | 1242 |
| MRSA carriers, n (%) | 4 (0.3) | 7 (0.6) | 5 (0.4) | 9 (0.7) |
| ESBL carriers, n (%) | 6 (0.5) | 9 (0.8) | 14 (1.2) | 11 (0.9) |
| Urinary catheters, n (%) | 15 (1.3) | 22 (1.9) | 17 (1.4) | 21 (1.7) |

MRSA, meticillin-resistant *Staphylococcus aureus*
ESBL, extended-spectrum beeta-lactamase producing Enterobacteriaceae

female. Physical function was best among patients in sheltered care, where half the patients managed independent toileting. Dementia was by far the most common in dementia units, yet in healthcare center hospitals and sheltered care units, around 40% of the patients also suffered from dementia.

MRSA carriers were found in all types of settings. The overall carrier rate of MRSA was 0.7% at baseline, which increased during the follow-up about one percentage point ($p<0.001$). The overall carrier rate of ESBL was 0.6% at baseline; it increased about half a percentage point ($p=0.10$). Of all the patients at the

baseline, 95 (2.7%) had urinary catheters, most of which (67%) were transurethral. Urinary catheters were used in all settings, but less frequently in dementia units. The use of urinary catheters increased over one percentage point (p=0.043) to about 4%, mostly in healthcare centre hospitals (Table I).

The total amount of hand rub used increased by 70 %, from the mean of 7.3 (SD; 5.1) liters/1000 patient days at the baseline to 12.4 (SD; 14.9) in the year 2008. A statistically significant increase was detected in all types of settings from 2005 to 2006: the mean change (95% CI) of the amount of hand rub was in healthcare center hospitals 4.4 (0.8 to 7.9) [p=0.015], and respectively in nursing homes 3.5 (0.4 to 8.1) [p=0.048], in dementia units 6.7 (1.5 to 13.0) [p=0.021] and in sheltered care units 1.9 (0.2 to 3.8) [p=0.035]. The level obtained was sustained from 2006 to 2008 (Figure 1).

## Discussion

Our results show that the site visits by a multidisciplinary team were successful in promoting infection control activities in LTCFs. In all types of settings, the amount of alcohol-based hand rubs used increased and was sustained during the three-year follow-up. At the baseline visit there were some sheltered care units that did not use alcohol-based hand rubs at all. During the follow-up, all study units were using the hand rubs.

The amount of alcohol-based hand rub used varied between 6.6 and 9.4 liters. Reference data on hand rub consumption per patient days in LTCFs are scarce. In Finnish acute care hospitals, the median amount of hand rub used was 47 liters/1000 patient days, and in intensive care units (ICUs) it was 120 liters/1000 patient-days, [13] which is clearly more than in German hospitals (14 in non-ICU wards and 73 in ICUs).[14] In some study units the amount of hand rub used was very high. However, some reporting error cannot be ruled out. It is also possible that the amount of alcohol-based hand rub ordered by units during previous month is different from that which was actually used. It would be more accurate if the units were to report the annual amount of alcohol-based hand rub they have ordered.

During the visits we advised personnel on locations for additional containers for alcohol-based hand rubs. Providing easy access to alcohol-based hand rub has been shown to improve the hand hygiene compliance.[15] A Canadian study showed that in 20% of LTCFs alcohol-based hand rub was placed at the point of care, 34% were placed in hallways, and 79% were placed in other areas.[16] Alcohol-based hand rub should be available near to point of care.

We did not observe hand hygiene compliance. In observational studies from LTCFs figures have been low, 14.7%[17] and 17.5%.[18] In an intervention study in Hong Kong LCTFs which used pocket containers of alcohol-based hand rub, together with education and posters, the adherence increased from 26% to 33%.[19] A reduction in the incidence of pneumonia was even reported during the same intervention.

Despite the sustained increase in the use of hand rubs, the overall carrier rate of MRSA and ESBL increased. We do not know whether the new MRSA and ESBL cases had been transferred from acute-care hospitals to LTCFs or whether the acquisition or transmission had occurred in the study units. Moreover, we did not take any bacterial cultures, and therefore, we do not know the actual number of MRSA/ESBL carriers or infections. There was no continuing education programme for hand hygiene for LTCFs going on.

The visiting team included experts in infectious disease and infection control, allowing a wide range of infection control issues to be discussed with LTCF personnel. The structured interview could have been conducted through a postal survey or telephone interviews, but the interpersonal and interdisciplinary communication would have been lacking as well as the evaluation of the physical environment, all of which were important for future communication and collaboration.

Our results show that LTCFs do learn to use alcohol based hand rubs. A regular training program in hand hygiene is needed in LTCFs. When the hand rub bottles are placed at the point of care in LTCFs, it will be time for an adherence study.

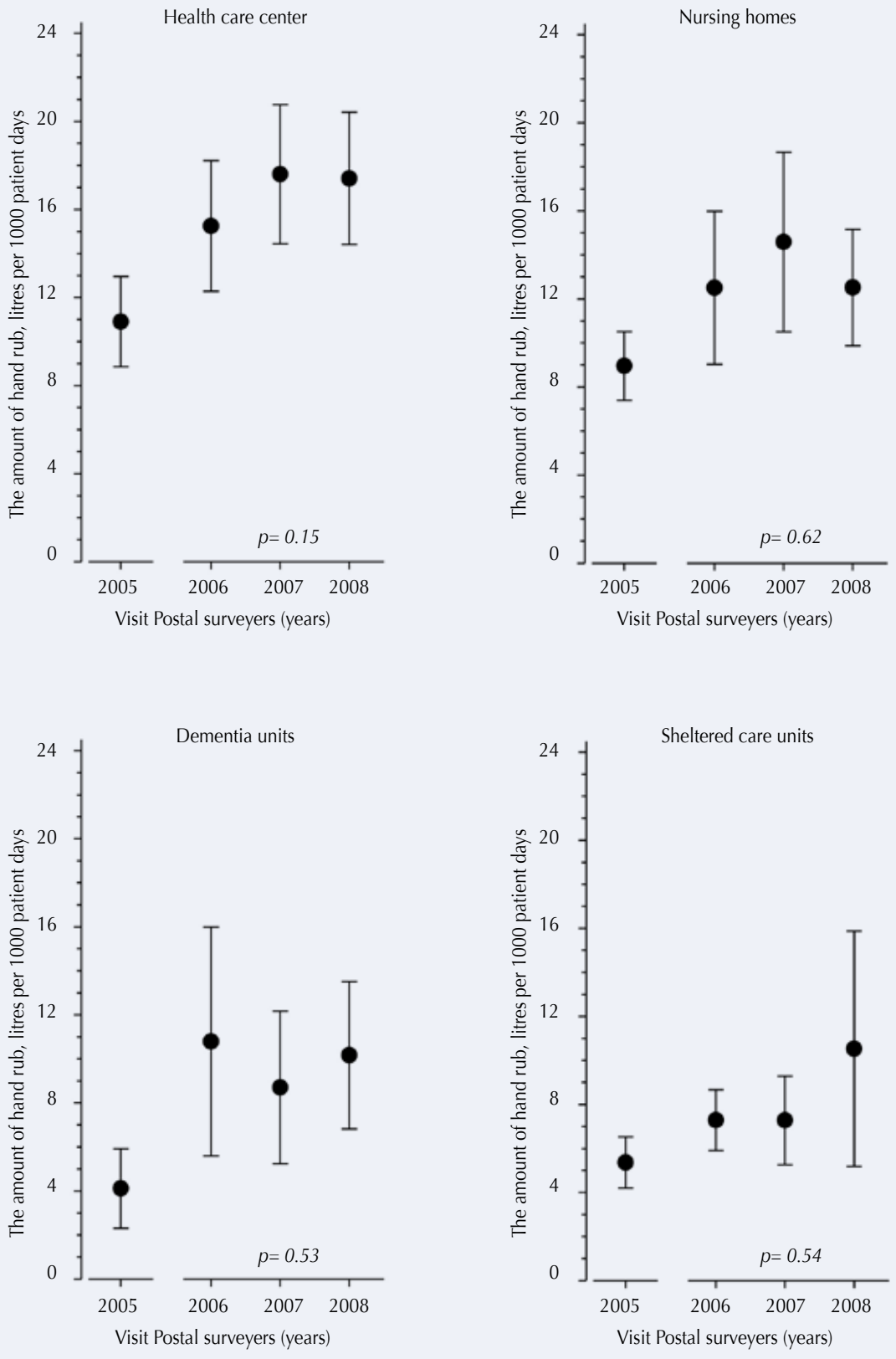


**Figure 1. Amount of hand rub used (liters per 1000 patient-days) at the baseline visit by type of setting and during three annual postal surveys Means with 95% CI.**

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