National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Cost analysis of a hand hygiene improvement strategy in LTCFs

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Hosted by Dr. Hugo Sax

Objectives

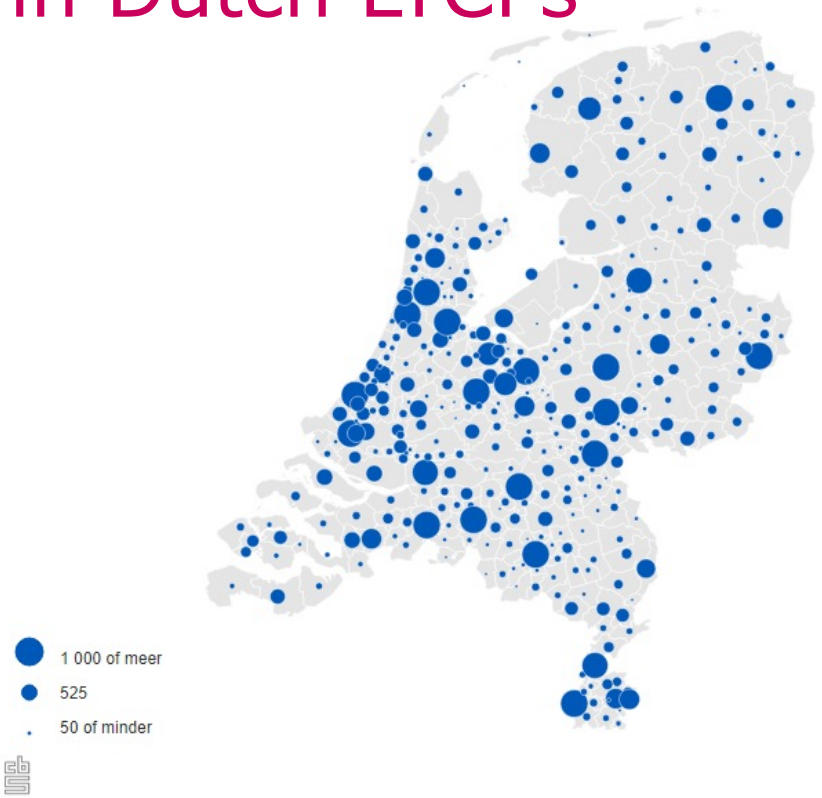
- Insight into an example of how to conduct a cost analysis to evaluate whether the cost of a successful tailored multifaceted strategy to improve hand hygiene compliance outweighs the savings by reducing infection costs in LTCFs in the Netherlands.

- Understanding the costs of a successful tailored multifaceted strategy to improve hand hygiene compliance

- Insight into the number and type of infections prevented by improved hand hygiene and associated cost savings

Number of occupants in Dutch LTCFs

115 000



Long-term care act

If you need intensive long-term care, for example due to a disability or mental illness, you can receive care under the Long-Term Care Act (Wlz).

For this, you must request a Wlz-indicatie (Wlz indication) from the Care Needs Assessment Centre (CIZ). The CIZ will assess the care you need.

Elderly care physician

The elderly care physician endeavours to maintain and improve the quality of life of elderly people and chronic patients.

Elderly care physicians are experts in the field of terminal and palliative care. They also provide medical care to elderly people who need rehabilitation.

Dutch LTCFs

An elderly care physician examines patients and investigates the need for paramedical care such as physiotherapy, occupational therapy or speech therapy. They are also call-in medical specialists for advice and treatment support and maintain frequent contact with the patient’s family.

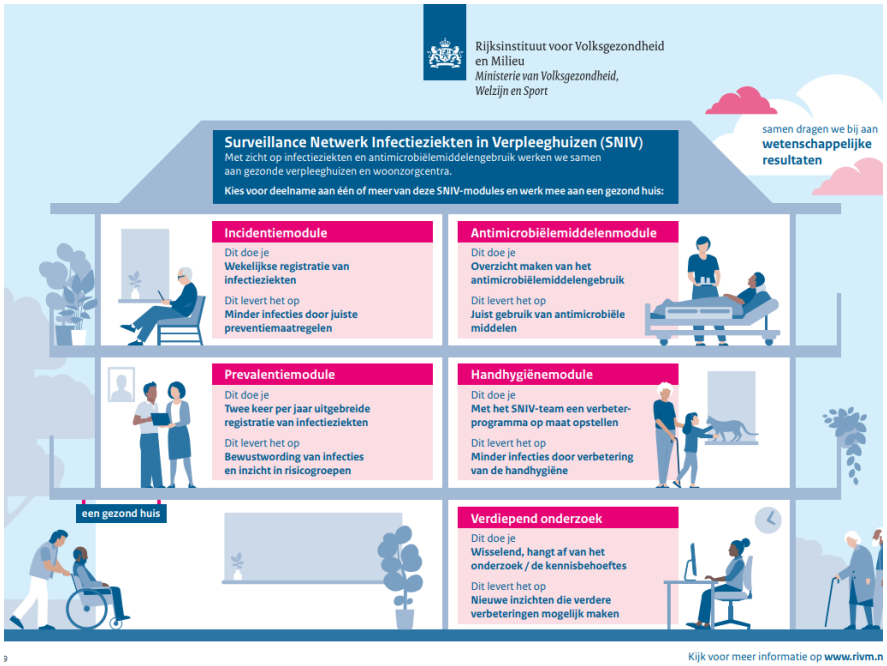
As most patients stay in a LTCF for two or three years, the elderly care physician gets to know these patients for a longer period, and they form a close bond with them.

National surveillance

Since 2009 there is a national sentinel surveillance network to monitor HAI.
SNIV coordinates the surveillance, provides national baseline data, organizes (online) training sessions for participating LTCFs, and provides feedback through institutional and national reports.

Four surveillance modules:
Incidence module /Prevalence module/ Antimicrobial use module/Hand hygiene module

Surveillance Network Infections in LTCFs



Incidence module

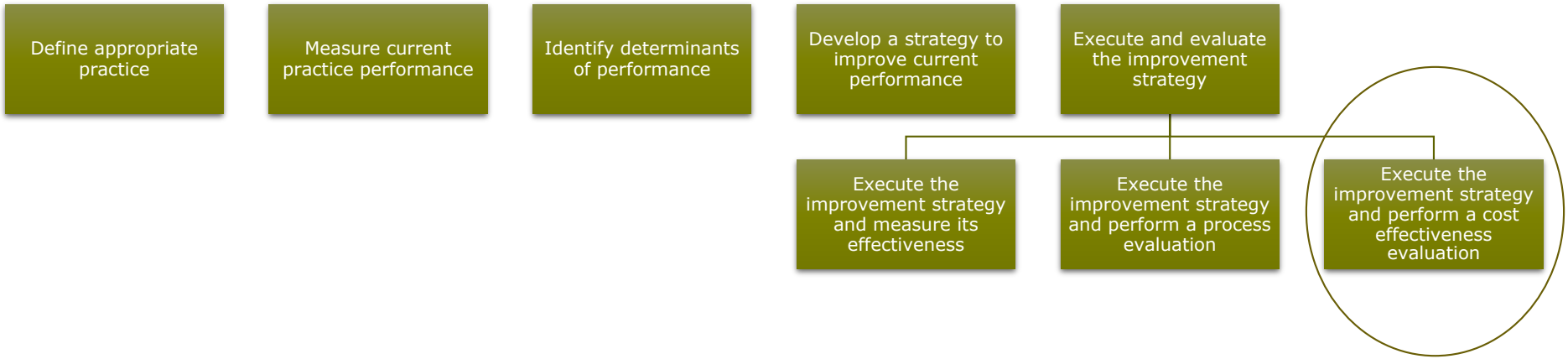
- Incidence rates give insight in the rate of new cases per time interval. The presence of the following HAIs is registered weekly:
  - urinary tract infections,
  - lower respiratory tract infections,
  - influenza-like illness,
  - gastrointestinal infections
- The weekly data of the incidence module is not traceable to individual residents.

CHANGE

Compliance with HAnd hygiene
in Nursing homes;
Go for a sustainable Effect
(CHANGE)

The implementation of a tailored multifaceted intervention strategy to improve hand hygiene in nursing homes

A step by step approach*



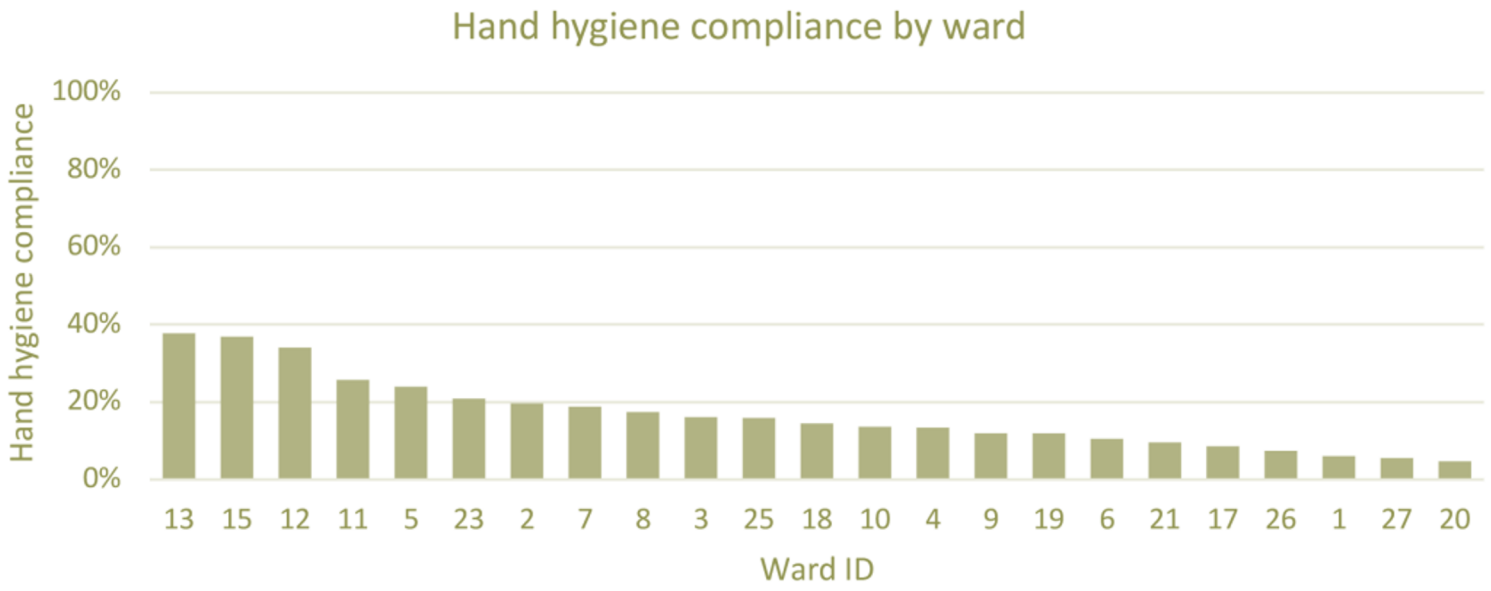
* Wensing M, Grol R. implementation model

Stepped wedge design

Intervention Group (wards)	2017										2018												2019		
	3*	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1 (n=7)	HH1	Int				HH2					HH3					HH4					HH5				
2 (n=5)	HH1					HH2	Int				HH3					HH4					HH5				
3 (n=5)	HH1					HH2					HH3	Int				HH4					HH5				
4 (n=6)	HH1					HH2					HH3					HH4	Int				HH5				

HH= hand hygiene measurement period, Int= intervention period, *Months of the year

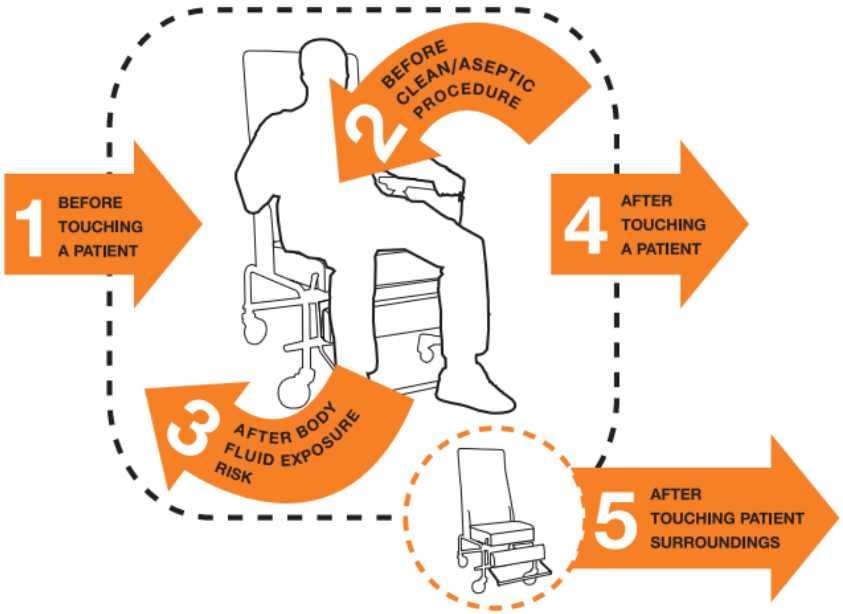
Hand hygiene compliance by ward



Improvement strategy

- A combined educational and training session delivered by an infection control expert (1 hour)
- Provision of educational leaflets
- Provision of reminders (i.e., posters)
- A hand hygiene observation session (including direct and personal feedback) performed by an infection control expert (4 hours)
- Two team meetings (including delayed feedback) (for 1.5 and 1 hour, respectively), both guided by the team manager and an external coach with extensive experience who was instructed by the research group

My 5 moments of hand hygiene



Study design

Intervention Group (LTCFs)	2017			2018			2019					
1 (n=4)	Usual care period (infection-related costs)	Intervention period (infection-related costs + costs of the intervention)	Post-intervention period (infection-related costs + costs of the intervention)									
2 (n=3)	Usual care period (infection-related costs)			Intervention period (infection-related costs + costs of the intervention)	Post-intervention period (infection-related costs + costs of the intervention)							
3 (n=4)	Usual care period (infection-related costs)					Intervention period (infection-related costs + costs of the intervention)	Post-intervention period (infection-related costs + costs of the intervention)					
4 (n=3)	Usual care period (infection-related costs)								Intervention period (infection-related costs + costs of the intervention)	Post-intervention period (infection-related costs + costs of the intervention)*		

* Subsequent four months for potential after-effect

Cost analysis

Healthcare perspective

Costs of the intervention versus the savings (infections and their associated treatment costs prevented)

Three periods compared

usual care period (infection related costs)

intervention period (combined infection related costs + intervention costs in this period)

post-intervention period (combined infection related costs + intervention costs in this period)

Infection related costs

Infection	References	Average cost per infection in euros * Consumer price index (2019)	Infection price in euros
Gastroenteritis	Friesema et al. (10)	142 * 2.1 (2012)	298.10
Influenza-like illness	Carroll et al. (11)	183 * 3.1 (2001)	567.30
(Probable) pneumonia	Kruse et al. (12)	387 * 1.9 (2003)	735.00
Urinary tract infections	van den Hout et al. (13)	196 * 1.3 (2013)	254.80

Intervention costs

The costs incurred from performing the hand hygiene improvement strategy activities (hours spent by the intervention providers and the participants on the training session and team meetings), multiplied by hourly rate; material costs.

The additional costs for improved hand hygiene compliance (ie, the costs of alcohol-based handrub solution) plus the time to perform hand hygiene.

Costs of the improvement strategy activities

The hand hygiene improvement strategy costs were calculated per activity per LTCF and then averaged. The average cost of the improvement strategy was 2116 euro per LTCF.

Overview costs of the improvement strategy

Overview of the Average Costs of the HH Improvement Strategy per LTCF

Activity	Components	Average Costs in euros per LTCF	
Training session	• Attendance trainer (salary × hours)*	32.81 × 1.4	796
	• Travel costs trainer (km × 0.19)	112 × 0.19	
	• Materials (UV-lamp and hand rub)	100	
	• Preparation time (salary × hours)*	32.81 × 8	
	• Attendance nurses, nurse assistants, care assistants and housekeeping assistants (salary × hours)†	23.16 × 16	
Reminders	• Posters and folders (printing costs)	4	4
Observation session	• Attendance observer (salary × hours)*	32.81 × 2.5	103
	• Travel costs observer (km × 0.19)	112 × 0.19	
Team meetings	• Attendance trainer (salary × hours)*	32.81 × 2,5	1213
	• Travel costs trainer (km × 0.19)*	112 × 0.19	
	• Preparation time (salary × hours)*	32,81 × 7.5	
	• Feedback time (salary × hours)*	32,81 × 4	
	• Attendance manager (salary × hours)†	37,49 × 1	
	• Attendance nurses, nurse assistants, care assistants and housekeeping assistants (salary × hours)†	23,16 × 12 × 2,5	
Total			2116

*Salary trainer.[16]
†Salary nurses, nurse assistants, care assistants, housekeeping assistants, and managers.[17]

Costs for improved hand hygiene + time to perform

The costs for alcohol-based handrub were calculated with the Alcohol-Based Handrub Planning and Costing Tool from the WHO. These costs were calculated per LTCF and then averaged.

The time for hand hygiene was calculated by applying the following formula: [(nurse ratio per 24 hours* number of hand hygiene opportunities per hour * 5 hours of patient contact *time of hand rubbing * actual loss of productivity per hour * 365 days/3600 seconds)*hand hygiene compliance/100].The extra time was calculated per LTCF, based on the percentage of improved hand hygiene after the intervention, and then averaged.

Cost analysis

The infection-related costs for all LTCFs per week per period ("usual-care," "intervention," and "post-intervention")

Plus for the "intervention period" and the "post-intervention" period the intervention costs (ie, costs of performing the hand hygiene improvement strategy activities and the additional costs of improved hand hygiene compliance) for the participating LTCFs per week for 1 year

Since the effect of our intervention may persist even longer, we also performed calculations for an extended period of 18 months (78 weeks) and 24 months (104 weeks)

Infection-related Costs

Mean Infection-related Costs by Week per Period per LTCF per Type of infection, Adjusted for Time and Clustering

Infection	Study Period		
	Usual-care euros (95% CI)	Intervention euros (95%CI)	Post-intervention euros (95%CI)
Gastroenteritis	43 (−5 to 90)	47 (−7 to 100)	70 (21 to 118)
ILI	74 (17 to 132)	63 (−18 to 144)	29 (−4 to 61)
(Probable) pneumonia	306 (187 to 424)	215 (100 to 331)*	341 (216 to 467)
UTIs	244 (157 to 330)	207 (117 to 297)	214 (132 to 296)
All infections	680 (450 to 910)	540 (299 to 782)†	652 (435 to 870)

*Δ intervention-usual-care $P < .001$.
†Δ intervention-usual-care $P < .05$.

Intervention Costs

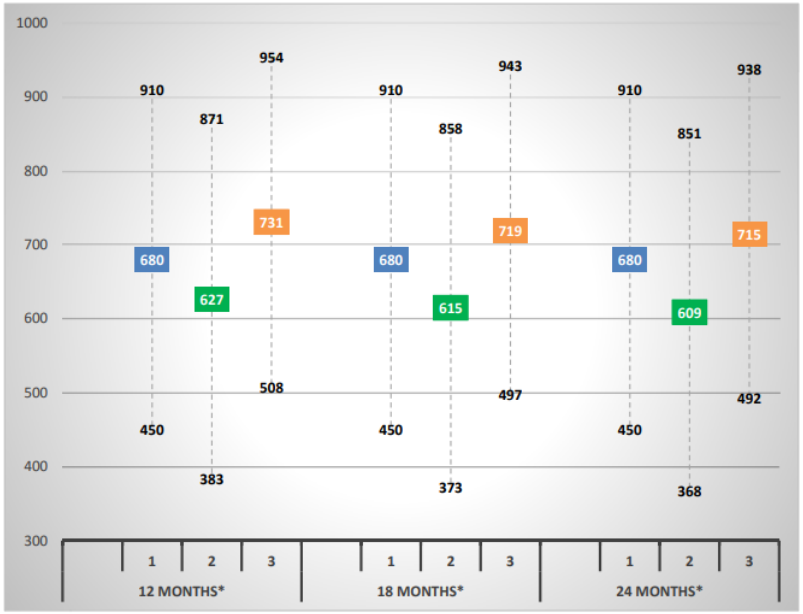
Intervention strategy costs

- On average, strategy costs were 2116 euros

Improved hand hygiene costs

- The improved hand hygiene compliance costs were 1949, 2924, and 3898 euros per LTCF, assuming a sustainability of the intervention effect of 12, 18, and 24 months, respectively

Cost analysis



Usual care (infection-related costs)

Intervention (infection-related costs + intervention costs)

Post Intervention (infection-related costs + intervention costs)

----- 95%CI

* assumed sustainability of the effect periods

Discussion

There are no significant differences in total costs considering the 3 periods (ie, “usual-care” period, “intervention” period, and “postintervention” period). Costs appear slightly lower during the “intervention” period, probably because infection-related costs were significantly lower in the “intervention” period compared with infection-related costs in the “usual-care” period ($P < .05$).

- The cost analysis can be considered conservative, as only the infection-related costs are included, not the capacity to prevent discomfort for residents. Moreover, not only the additional alcohol consumption due to better hand hygiene was considered but also the extra time involved in increased hand hygiene compliance.
- If 6 cases of pneumonia are prevented in the time the intervention is effective on hand hygiene compliance, the savings far outweigh the financial investment of the intervention.
- The infections are registered at institutional level and not of participating wards. The risk of dilution of the intervention effect by including the infection-related costs of nonintervention wards is likely.
- Existing literature was used to calculate the infection-related costs, as participating LTCFs did not record the actual costs per individual infection. The calculated infection-related costs in this study may be lower than those in other countries.

Conclusion

In conclusion, our multifaceted hand hygiene improvement strategy achieves cost savings, and even with conservative estimates, the costs of performing the strategy are worthwhile.

For future studies, we recommend tracking the actual infection costs and measuring infections only in wards participating in the study and exposed to the intervention

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