

Hand hygiene compliance in home-based nursing care: Insights from an unobtrusive observational study

Name	FNM Pluk
Student number	6216471
Status	Final
Date	18 June 2020
Institute	Master's program in Clinical Health Sciences - Nursing Science Utrecht University - University Medical Center Utrecht
Mentor	Anita Huis, PhD Radboud Institute for Health Sciences - IQ healthcare, Nijmegen
Lecturer	Rob Zwitterlood, PhD
Intended magazine	American Journal of Infection Control
Reporting guideline	STROBE checklist for cross-sectional studies
Number of words	3414
Number of words (Dutch abstract)	289
Number of words (English abstract)	298

Abstract

Title

Hand hygiene compliance in home-based nursing care: Insights from an unobtrusive observational study.

Rationale

Every month, 270,000 people in the Netherlands receive home-based nursing care (HBNC). Patients receiving HBNC are at a high risk for healthcare-associated infections (HAIs). Hand hygiene is the most important measure to prevent HAIs. However, literature on HAIs and hand hygiene compliance in HBNC is scarce.

Objective

The primary objective of this research is to examine hand hygiene performance (i.e. compliance and technique) in HBNC. Secondary objectives are compliance with personal hygiene and handling of mobile devices with regards to hygiene.

Methods

With a quantitative, cross-sectional study design data were collected at a Dutch HBNC organization. Nurses and professional caregivers were observed directly and unobtrusively. Compliance data were analyzed using descriptive statistics. Pearson's chi-square tests were performed to assess possible differences between the overall compliance and the compliance rates of the five hand hygiene moments and between the overall compliance and the professional statuses. A possible relation between hand hygiene compliance and compliance with personal hygiene was explored using correlation measures.

Results

Twenty-two healthcare workers were observed visiting 134 patients. This resulted in 443 hand hygiene opportunities. Hand hygiene compliance for individual participants varied from 10.0% to 63.0%, with an overall compliance of 35.0%. When technique was added, this compliance rate decreased to 13.1%. The compliance with personal hygiene (81.8%) and correct use of devices (27.5%) differed strikingly.

Conclusion and recommendations

Hand hygiene was performed correctly in only 13.1% of 443 opportunities. The results of this study are a first insight into hand hygiene compliance in HBNC in the Netherlands and should be repeated at multiple Dutch HBNC organizations. These results could help in developing a hand hygiene improvement intervention for the HBNC setting.

Keywords

Hand hygiene, home care services, compliance, nurses

Samenvatting

Titel

Handhygiëne naleving in de thuiszorg: Een observationele studie.

Achtergrond

In Nederland ontvangen per maand 270.000 mensen thuiszorg. Deze patiëntengroep loopt een groot risico op het krijgen van een ziekenhuisinfectie. Handhygiëne is het meest effectieve middel om ziekenhuisinfecties te voorkomen. Er is weinig literatuur beschikbaar over de naleving van handhygiëne in de thuiszorg.

Doel

Het primaire doel is het onderzoeken van handhygiëne (naleving en techniek) in de thuiszorg. Secundaire doelen zijn de naleving van richtlijnen rond persoonlijke hygiëne en de omgang met mobiele apparaten.

Methode

Met een kwantitatief, cross-sectioneel onderzoeksdesign zijn data verzameld binnen een Nederlandse thuiszorgorganisatie. Verpleegkundigen en verzorgenden zijn direct en onopvallend geobserveerd. De nalevings-data zijn geanalyseerd met beschrijvende statistiek. Pearson's chi-kwadraat toetsen zijn gebruikt om een mogelijk verschil te detecteren tussen de totale naleving en de vijf momenten van handhygiëne en tussen de totale naleving en de beroepsgroepen. Een mogelijk verband tussen naleving van handhygiëne en persoonlijke hygiëne werd onderzocht met correlatie.

Resultaten

Tweeëntwintig participanten zijn geobserveerd bij 134 patiënten, dit resulteerde in 443 momenten van handhygiëne. De naleving van handhygiëne varieerde voor individuele participanten van 10.0% tot 63.0%, met een algehele naleving van 35.0%. Als dit percentage werd gecombineerd met techniek, daalde het tot 13.1%. Tussen de naleving van persoonlijke hygiëne (81.8%) en het correct gebruik van mobiele apparatuur (27.5%) zat een opvallend verschil.

Conclusie en aanbevelingen

Handhygiëne werd in 13.1% van de 443 momenten correct uitgevoerd. De resultaten van deze studie geven een eerste beeld van de naleving van handhygiëne in de Nederlandse thuiszorg. Het is aan te bevelen deze studie te herhalen bij meerdere Nederlandse thuiszorgorganisaties, zodat deze resultaten bij kunnen dragen aan de ontwikkeling van een interventie ter verbetering van de handhygiëne in de thuiszorg.

Zoekwoorden

Handhygiëne, thuiszorg, naleving, verpleegkundigen, verzorgenden

Background

The number of people receiving home-based nursing care (HBNC) is growing rapidly.^{1–5} This increase is due to demographic changes and efforts to reduce the duration of hospital stays, combined with the wishes of patients and their relatives.^{1–5} Every month, approximately 270,000 people in the Netherlands receive HBNC.^{6,7} The conditions for which HBNC patients are treated are becoming increasingly complex.³ In addition, high-tech HBNC, such as infusion therapy, home mechanical ventilation, and dialysis, is more prevalent today than ever before.³ These complex techniques, the advanced age of patients, chronic illnesses, illnesses with a bad prognosis, and immunosuppression put HBNC patients at high risk of healthcare-associated infections (HAIs) and new infectious diseases, such as COVID-19.^{3,4,8,9} The most common HAIs are urinary tract infections, wound infections, pneumonia, and bloodstream infection.^{3,4,10,11}

Healthcare-associated infections lead to increased risk of morbidity, mortality, unplanned hospitalization, and antibiotic resistance.^{5,12,13} They are prejudicial to the wellbeing of patients and their relatives and increase healthcare costs in different ways: patients receive extra treatments, care for these patients is more complicated, and patients require HBNC for an extended period of time or are re-hospitalized.^{3,14,15}

Healthcare workers' (HCWs') hands are a key transporter for the transmission of HAIs from patient to patient.¹⁶ This makes hand hygiene the most important measure to reduce the transmission of pathogenic microorganisms and prevent HAIs.^{12,16,17} Despite this knowledge, compliance with hand hygiene measures remains low in various settings.^{16,18} Compliance with personal hygiene regulations for HCWs (i.e. clothing, hair, jewelry and nails) and with the handling of mobile devices are other issues related to the prevalence of HAIs.^{19–30}

Many studies have been carried out in the fields of prevalence of HAIs, their risk factors, and improvement strategies.^{2,3,5} However, despite the large number of patients at risk, research on HAIs is scarce in the HBNC setting.^{2,3,5} The little research that has been conducted in this setting showed that infection is common in HBNC, with infection rates varying from 5.1% to 70.0%.^{5,8}

Although hand hygiene in the HBNC setting has specific challenges and focuses and is less structured and controlled than in an institutional setting, studies on hand hygiene compliance in the HBNC setting are also scarce.² One Australian study reported 59.2% hand hygiene compliance in HBNC.³¹ This research, however, used overt observations that are known to affect human actions when a person knows that they are being observed.^{32–34} In addition, this research used a small sample size (eight nurses, 103 hand hygiene opportunities), therefore its generalizability is questionable.³⁵

Exploring current practice regarding hand hygiene compliance in HBNC will determine the possible necessity of an improvement process. Furthermore, monitoring compliance is considered to be an essential component in improvement strategies.^{36,37} Three recent literature reviews collated improvement strategies to enhance hand hygiene compliance.^{14,33,38} None of the total of 51 studies included was conducted for HBNC. As Shang et al. recommended, new evidence regarding hand hygiene in HBNC is necessary, with a focus on HBNC patients in general.⁵ To date, there has been no published research with this focus in the Netherlands.

Aim

The primary objective of this research is to examine hand hygiene performance (i.e. compliance and technique) in HBNC. Secondary objectives are compliance with personal hygiene and handling of mobile devices with regards to hygiene.

Methods

Design

This study had a quantitative, cross-sectional design. A cross-sectional design is particularly appropriate for assessing the prevalence of a given issue, such as hand hygiene compliance.^{35,39}

Setting and population

The current study aimed to describe the hand hygiene compliance of Dutch nurses and professional caregivers in HBNC. This research was conducted at a healthcare organization in the south east of The Netherlands, which had a hospital, multiple nursing homes, and HBNC. The study population in this research consisted of 460 nurses and professional caregivers working together in 65 HBNC teams in 20 townships. Nurses were both bachelor and associate nurses. Professional caregivers were both level 3 and level 3IG (Table 1). Participants had to be qualified nurses or professional caregivers and 18 years of age or older. HBNC teams were randomly selected, and a convenience sample of nurses and professional caregivers was used.³⁵

PLACE OF TABLE 1

Sample size

The sample size in the present study represented the number of hand hygiene opportunities rather than the number of participants. The use of a formula for calculating the sample size in a cross-sectional design requires the population prevalence to be specified.⁴⁰ Population prevalence should be considered as hand hygiene compliance, as reported in previous studies.^{41,42} However, as there is no published research on hand hygiene compliance in Dutch HBNC, this formula could not be applied. Furthermore, the use of sample size calculations is reported as informal in cross-sectional studies.^{43,44} Most studies conducted to improve hand hygiene compliance have used baseline measurements. These baseline measurements varied from 524 to 4653 hand hygiene opportunities.^{45–52} In the present study, it was planned to attend 36 nurses and professional caregivers visiting to at least four patients each in order to make sufficient observations. A minimum of five hand hygiene opportunities per patient were expected to be observed, providing an expected count of $36 \text{ HCWs} \times 4 \text{ patients} \times 5 \text{ opportunities} = 720 \text{ opportunities}$.

Data collection

Data collection was planned to take place from January 2020 to May 2020. Nurses and professional caregivers were observed direct and unobtrusively. Observations were unobtrusive because this prevents the Hawthorne effect,^{53–55} which is an observation bias that can occur when people act differently when they are being observed to how they would usually behave.^{54,56} A derivative of the observation form of the World Health Organization (WHO) was used to collect data (Appendix A).⁵³

Parameters in this study were operationalized according to the guidelines of the National Institute of Public Health and Environment and the WHO (Table 2).^{12,57–65} The hand hygiene opportunity “after using disposable gloves” was appended to the “My five moments for hand hygiene”, which are “before contacting the patient”, “after contacting the patient”, “after contacting the patient’s environment”, “before clean/aseptic proceedings”, and “after contact with body fluids”.^{57,65,66} The correct hand hygiene technique was operationalized as rubbing hands with an alcohol-based hand rub solution for more than 20 seconds, or as washing hands according to the four steps of the WHO.^{59–64} Compliance with personal hygiene was operationalized with regulations about clothes, jewelry, hair, nails, and shoes.⁵⁸ Correct handling of mobile phones and tablets regarding hygiene was operationalized as using devices after performing hand hygiene or cleaning immediately after use and as not using them wearing personal protective equipment.^{57,58,65}

PLACE OF TABLE 2

Study procedures

An information email was sent to selected HBNC teams. This email described the study as patient safety research, with issues as medication errors, to prevent the Hawthorne effect.⁴⁵ Hand hygiene compliance, hand hygiene technique, personal hygiene, and the handling of mobile devices are indeed elements of patient safety.^{67–69} The researcher contacted the selected teams by telephone to determine two dates on which the researcher would accompany the HCWs. The HCWs were asked for verbal permission to be observed, and patients were asked for verbal permission on arrival on the day of observation. All observations were performed by the principal researcher. To minimize observational bias, the researcher trained herself by watching the WHO training film, practiced observing, and adhered to the observation methodology.^{35,56,66}

Data analysis

Demographic data are presented descriptively. Compliance data were analyzed using descriptive statistics. The overall and moment-specific hand hygiene compliances were calculated for the HCWs as a group, and were specified according to professional status (i.e. nurses and professional caregivers). Pearson's chi-square tests were performed to assess a possible statistical difference (i.e. $p < .05$) between overall compliance and the compliance rates of the five hand hygiene moments and between overall compliance and the compliance rates for the professional statuses. The hand hygiene technique is reported as a dichotomous outcome and as a percentage of overall compliance and was also segmented according to moment of hand hygiene, professional status, and action (i.e. washing and rubbing hands). Compliance with personal hygiene is reported as a percentage of the total of the five items.

Compliance with the correct handling of mobile devices is reported as a percentage of the total number of times the device was used. Compliance with personal hygiene and the handling of mobile devices is reported both as an overall percentage and according to professional status. A possible relation between hand hygiene compliance and compliance with personal hygiene was explored using correlation measures. Statistical analyses were performed with the IBM Statistical Package for Social Sciences software (Version 24).⁷⁰

Ethical issues

This study was conducted in line with the principles of the Declaration of Helsinki (Version 2008) and the Dutch Code of Conduct Scientific Integrity.^{71,72} In view of the lack of collection of patient data, this research was beyond the scope of the Wet medisch-wetenschappelijk onderzoek met mensen (Medical Research Involving Human Subjects Act). This was reflected in statements in earlier studies with comparable proceedings.^{45,73} Nurses and

professional caregivers, as well as patients, could leave the study at any time for any reason and without any consequences if they wished to do so. The researcher could decide to withdraw a nurse or professional caregiver from the study for urgent medical reasons.

Results

Due to the COVID-19 pandemic, data collection ended prematurely on 12 March 2020. This led to fewer participants being included and consequently fewer observed opportunities than planned. Therefore, analyzing for the different age categories was not useful.

Of 48 teams, 18 HBNC teams were randomly selected and informed by email. During the study, 13 teams were contacted by phone. All contacted teams were willing to participate and volunteered one or two HCWs. Twenty-two HCWs were included: 11 nurses and 11 professional caregivers. Most HCWs (50.0%) were between 46 and 55 years of age, and none of the participants was between the ages of 26 and 35 years of age. The baseline characteristics are presented in Table 3.

PLACE OF TABLE 3

During the observation sessions, it sometimes occurred that hand hygiene moments and/or hand hygiene performance could not be accurately assessed; for example, when the participant performed hand hygiene out of the researcher's sight. These events were not recorded as hand hygiene opportunities.

Hand hygiene compliance

The HCWs were each observed for three or four hours. In total, 134 patients were visited. This resulted in 443 hand hygiene opportunities. Hand hygiene compliance for individual participants varied from 10.0% to 63.0% (Table 4 and Figure 1).

PLACE OF TABLE 4 AND FIGURE 1

Overall hand hygiene compliance was 35.0%. Compliance rates varied by type of opportunity from 20.3% (before contact) to 51.4% (before clean) and by professional status from 31.1% (professional caregiver) to 39.0% (nurses) (Figure 2).

Some hand hygiene opportunities consisted of two opportunities occurring together. The chi-square tests made it necessary to split these opportunities, raising the total number of opportunities to 495. A statistically significant difference was found between overall compliance and the compliance rates of the five different moments of hand hygiene ($\chi^2 = 39.3$, $df = 4$, $p < .001$). No evidence was found for a significant difference between overall

compliance and the compliance rates for the professional statuses ($\chi^2 = 3.0$, $df = 1$, $p = .082$).

Technique

Of all actions performed ($n = 155$), 24.0% consisted of washing hands and 76.0% of rubbing hands with alcohol. Washing hands was considered to be performed correctly when following all four steps of the WHO, and rubbing hands was considered to be performed correctly when hands were rubbed with an alcohol-based solution for at least 20 seconds (Table 1). Hand hygiene technique was correct in 37.4%, resulting in 58 (13.1%) correctly performed hand hygiene actions. Figure 3 presents other results regarding hand hygiene technique.

PLACE OF FIGURE 3

Compliance with personal hygiene and handling mobile devices

Compliance with personal hygiene varied from 40.0% to 100%, with an overall compliance of 81.8%. Thirteen HCWs (59.1%) wore long sleeves (i.e. below the elbow) under their uniform, as presented in Table 5. The criterion “Wearing clean uniform every shift” had to be verified by the researcher at the end of the observation sessions. This was not verified 20 times and was therefore not included in the analysis. Mobile devices were used 91 times, and this was performed correctly 25 times. Compliance with the correct use of mobile devices varied from 0% to 100%, with an overall compliance of 27.5% (Table 5).

PLACE OF TABLE 5

Correlation between hand hygiene compliance and compliance with personal hygiene

Pearson’s correlation coefficient was not statistically significant ($r = .415$, $p = .055$), indicating that there was no linear correlation between hand hygiene compliance and compliance with personal hygiene.

Discussion

This study determined hand hygiene compliance, hand hygiene technique, compliance with personal hygiene, and with the correct handling of mobile devices in a Dutch HBNC setting. The compliance with personal hygiene (81.8%) and correct use of devices (27.5%) differed strikingly. Overall hand hygiene compliance was 35.0%, and, in 37.4% of these actions performed, the hand hygiene technique was correct. Consequently, hand hygiene was performed correctly in only 13.1% of opportunities.

In the literature, reported baseline hand hygiene compliance data vary a lot.¹⁴ In 2009, the WHO estimated hand hygiene compliance at 38.7% based on an average of multiple studies.¹² Differences in time, setting, and methodology make it complicated to compare these results. First, the WHO launched the hand hygiene program in 2009, and it is expected that hand hygiene compliance has improved since then. Secondly, these compliance data are based on settings other than HBNC (predominantly hospitals). Finally, in most of the studies reported by the WHO, several HCWs were included, not only nurses and professional caregivers.^{14,64} Therefore, the compliance rate reported by the WHO may be an underestimation for the recent study, as nurses generally score higher in hand hygiene compliance than other HCWs.^{74–76} In Dutch nursing homes, the reported baseline hand hygiene is estimated at 35.0%.⁷⁷ This is consistent with the results of this study. The reason for this similarity may be the comparability of the settings. The HBNC setting is probably more comparable with nursing homes than with hospitals in terms of patient category, as well as for HCWs working in these settings. The study of Felembam³¹ (to date the only published study on hand hygiene compliance in HBNC) used overt observations, as opposed to the unobtrusive observation method used in the current study. El-Saed compared overt and covert observations and reported a considerable overestimation of 94.0% when using overt observations.³⁴ This puts the compliance data of 59.2% of Felembam in another perspective.³¹ However, it is not clear how covert and unobtrusive observations relate and it seems impossible to use covert observations in HBNC.

The hand hygiene technique was correct in 37.4% of all actions performed; therefore, 443 opportunities resulted in 58 (i.e. 13.1%) correctly performed hand hygiene actions. This may endanger patients in this setting, as hand hygiene compliance has been shown to be associated with infection rates in HBNC.^{3,8} Previous studies showed that the use of the correct hand hygiene technique removes pathogenic microorganisms from the hands.^{78,79} However, it is not clear what the effect is of partially correct hand hygiene techniques and this reveals an uncertainty in the value of assessing compliance alone.

Major differences in compliance and technique were found between nurses and professional caregivers. Nurses scored 7.9% higher for compliance and 26.0% higher for technique. Educational attainment could be a cause of these differences, which has also been found in other studies.^{80,81}

The hand hygiene moment “before clean” had the highest compliance score in this study. This is notable, considering the fact that hand hygiene compliance tends to score highest in favor of self-protection (i.e. “after contact” and “after body fluids”).^{82–86} Correspondingly, “before clean”, referring to an action performed before a clean/aseptic procedure, scored low for compliance in previous research.^{16,82,87–90} It is conceivable that the HBNC setting of a procedure encourages the HCW to perform hand hygiene better when the patient’s

residence is contaminated or at least less “sterile” than in an institutional setting. This may influence the awareness of the significance of performing hand hygiene for the opportunity “before clean”. The fact that “before contact” had the lowest compliance is in line with previous research.^{16,82,87–90}

Compliance with personal hygiene was high, at 81.8%, with all items scoring over 85.0%, with the exception of wearing long sleeves (59.1%). Previous research showed various results for compliance with the absence of long sleeves, ranging from 28.0% to 100%.^{83,91}

Compliance with the absence of long sleeves may be confounded by the outdoor temperature, especially for outpatient settings.⁸³

Compliance with the correct handling of mobile devices regarding hygiene was low, at 27.5%. Previous research showed that mobile devices can be an infectious source and highlighted the safest way to use them during moments of care.^{92,93} Nevertheless, the findings of the current study suggest that HCWs are often ignorant of the importance of using mobile devices diligently.

Data collection ended due to the COVID-19 pandemic but before this crisis required nationwide measures and before the increase in public awareness of the importance of hand hygiene in preventing the transmission of pathogenic microorganisms. It may be interesting to resume data collection and thus investigate the potential differences in hand hygiene compliance before and after the COVID-19 pandemic. In addition, in order to be able to use the results of this study, it is inevitable that data will be collected again, as COVID-19 is likely to have an effect on hand hygiene compliance.

Strengths and limitations

To our knowledge, this is the first study that has combined hand hygiene compliance and hand hygiene technique to assess correct hand hygiene performance. Therefore, the results of this study are innovative and relevant, as preventing transmission is dependent on both compliance and technique. The inclusion of the assessment of compliance with personal hygiene and with the correct use of mobile devices renders the results more comprehensive than those of other studies. Moreover, the observed actions are not biased by inter-observer variability, as only one researcher performed all the observations. Finally, the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for reporting observational studies was used as a guideline, which enhanced the study.⁹⁴

However, this study has several limitations. The HCWs were a convenient sample, and this may have introduced selection bias. Another potential source of bias was the Hawthorne effect. Despite the unobtrusive observation method, it is conceivable that the researcher’s presence influenced the behavior of participants.^{32,95} Furthermore, the assessment of hand hygiene technique was not operationalized according to the WHO guidelines in order to keep

the observation method operable.⁶⁴ The hand hygiene technique results may therefore be overestimated and cannot be compared with previous research. Data collection could not be completed due to COVID-19 pandemic, resulting in the observation of only 22 HCWs instead of the intended 36. This makes the generalizability questionable, in particular the results that link to individual participants, such as compliance with personal hygiene. Furthermore, the smaller sample size increased the impact of individual compliance rates on overall compliance.

Practice implications

The outbreak of the COVID-19 pandemic emphasizes the importance of HCWs' adherence to hand hygiene guidelines, as hand hygiene contributes to the prevention of spreading the disease.^{96,97} Therefore, the results of this study are of great importance in terms of awareness and of relevance to a current issue.

Research implications

The current study should be repeated in other HBNC organizations in the Netherlands to further explore hand hygiene performance in this setting. The results of these studies, supplemented with the assessment of barriers and facilitators, could help in developing a hand hygiene improvement intervention for the HBNC setting. Consideration should be given to the different results for the types of HCWs, as this may indicate differing needs in achieving improvement. The low compliance rates for correctly handling mobile devices reveal that this should be part of any improvement strategy, particularly considering the fact that working with a mobile device is inevitable for HCWs.

Conclusion

Hand hygiene was performed correctly in only 13.1% of 443 opportunities. It is notable that the hand hygiene moment "before clean" scored the highest compliance, which is in contrast with previous research. Compliance with the correct handling of mobile devices was low. However, the compliance with personal hygiene was high, at 80.0%. The results of this study are a first insight into hand hygiene performance in HBNC in the Netherlands and indicate the necessity of an improvement intervention.

References

1. National Clinical Guideline Centre (UK). Infection: Prevention and Control of Healthcare-Associated Infections in Primary and Community Care: Partial Update of NICE Clinical Guideline 2. Royal College of Physicians (UK); 2012.
2. Rhinehart E. Infection Control in Home Care. *Emerg Infect Dis.* 2001 Apr;7(2):208–11.
3. Shang J, Larson E, Liu J, Stone P. Infection in home health care: Results from national Outcome and Assessment Information Set data. *Am J Infect Control.* 2015 May 1;43(5):454–9.
4. Manangan LP, Pearson ML, Tokars JI, Miller E, Jarvis WR. Feasibility of National Surveillance of Health-Care-Associated Infections in Home-Care Settings. *Emerg Infect Dis.* 2002 Mar;8(3):233.
5. Shang J, Ma C, Poghosyan L, Dowding D, Stone P. The prevalence of infections and patient risk factors in home health care: A systematic review. *Am J Infect Control.* 2014 May;42(5):479–84.
6. Ministerie van Volksgezondheid Welzijn en sport. Monitor Langdurige Zorg [Internet]. [cited 2019 Sep 11]. Available from: <https://www.monitorlangdurigezorg.nl/>
7. Vektis. Wijkverpleging - Zorgprisma Publiek [Internet]. [cited 2019 Sep 11]. Available from: <https://www.zorgprismapubliek.nl/producten/zorg-dichtbij/wijkverpleging/>
8. Miliani K, Miguères B, Verjat-Trannoy D, Thiolet JM, Vaux S, Astagneau P, et al. National point prevalence survey of healthcare-associated infections and antimicrobial use in French home care settings, May to June 2012. *Eurosurveillance.* 2015 Jul 9;20(27).
9. Patte R, Drouvot V, Quenon J-L, Denic L, Briand V, Patris S. Prevalence of hospital-acquired infections in a home care setting. *J Hosp Infect.* 2005 Feb 1;59(2):148–51.
10. van der Kooi TII, Manniën J, Wille JC, van Benthem BHB. Prevalence of nosocomial infections in The Netherlands, 2007–2008: results of the first four national studies. *J Hosp Infect.* 2010 Jul;75(3):168–72.
11. McFee RB. Nosocomial or hospital-acquired infections: an overview. *Dis Mon.* 2009 Jul;55(7):422–38.
12. World Health Organization. WHO guidelines on hand hygiene in health care : first global patient safety challenge clean care is safer care. 2009
13. Friedrich AW. Control of hospital acquired infections and antimicrobial resistance in Europe: the way to go. *Wiener Medizinische Wochenschrift.* 2019 Feb 8;169(S1):25–30.
14. Kingston L, O’Connell NH, Dunne CP. Hand hygiene-related clinical trials reported since 2010: a systematic review. *J Hosp Infect.* 2016 Apr 1;92(4):309–20.
15. Erasmus V, Huis A, Oenema A, van Empelen P, Boog MC, van Beeck EH, et al. The ACCOMPLISH study. A cluster randomised trial on the cost-effectiveness of a multicomponent intervention to improve hand hygiene compliance and reduce healthcare associated infections. *BMC Public Health.* 2011 Sep 24;11(1).
16. Allegranzi B, Pittet D. Role of hand hygiene in healthcare-associated infection prevention. *J Hosp Infect.* 2009;73(4):305–15.

17. Labrague LJ, McEnroe-Petitte DM, van de Mortel T, Nasirudeen AMA. A systematic review on hand hygiene knowledge and compliance in student nurses. *Int Nurs Rev.* 2018 Sep 1;65(3):336–48.
18. Huis A, van Achterberg T, de Bruin M, Grol R, Schoonhoven L, Hulscher M. A systematic review of hand hygiene improvement strategies: a behavioural approach. *Implement Sci.* 2012;7(1):1–14.
19. Toles A. Artificial Nails: Are They Putting Patients at Risk? A Review of the Research. *Journal of Pediatric Oncology Nursing.* 2002;19(5):164–71.
20. Hedderwick SA, McNeil SA, Lyons MJ, Kauffman CA. Pathogenic Organisms Associated with Artificial Fingernails Worn by Healthcare Workers. *Infect Control Hosp Epidemiol.* 2000 Aug;21(8):505–9.
21. Ulger F, Esen S, Dilek A, Yanik K, Gunaydin M, Leblebicioglu H. Are we aware how contaminated our mobile phones with nosocomial pathogens? *Ann Clin Microbiol Antimicrob.* 2009 Mar 6;8(1):7.
22. Ustun C, Cihangiroglu M. Health care workers' mobile phones: a potential cause of microbial cross-contamination between hospitals and community. *J Occup Environ Hyg.* 2012;9(9):538–42.
23. Fagernes M, Lingaas E, Bjark P. Impact of a Single Plain Finger Ring on the Bacterial Load on the Hands of Healthcare Workers. *Infect Control Hosp Epidemiol.* 2007 Oct;28(10):1191–5.
24. Trick WE, Vernon MO, Hayes RA, Nathan C, Rice TW, Peterson BJ, et al. Impact of Ring Wearing on Hand Contamination and Comparison of Hand Hygiene Agents in a Hospital. *Clin Infect Dis.* 2003 Jun 1;36(11):1383–90.
25. Jeans AR, Moore J, Nicol C, Bates C, Read RC. Wristwatch use and hospital-acquired infection. *J Hosp Infect.* 2010 Jan;74(1):16–21.
26. Bearman G, Bryant K, Leekha S, Mayer J, Munoz-Price LS, Murthy R, et al. Healthcare Personnel Attire in Non-Operating-Room Settings. *Infect Control Hosp Epidemiol.* 2014 Feb;35(2):107–21.
27. Banu A, Anand M, Nagi N. White coats as a vehicle for bacterial dissemination. *J Clin Diagnostic Res.* 2012 Oct 10;6(8):1381–4.
28. Summers MM, Lynch PF, Black T. Hair as a reservoir of staphylococci. *J Clin Pathol.* 1965;18:13–5.
29. Kerk SK, Lai HY, Sze SK, Ng KW, Schmidtchen A, Adav SS. Bacteria display differential growth and adhesion characteristics on human hair shafts. *Front Microbiol.* 2018 Sep 7;9:2145.
30. Brady RRW, Verran J, Damani NN, Gibb AP. Review of mobile communication devices as potential reservoirs of nosocomial pathogens. *J Hosp Infect.* 2009 Apr;71(4):295–300.
31. Felembam O, John WS, Shaban RZ. Hand hygiene practices of home visiting community nurses: Perceptions, compliance, techniques, and contextual factors of practice using the world health organization's 'five moments for hand hygiene'. *Home Healthc Nurse.* 2012 Mar;30(3):152–60.
32. Yin J, Reisinger HS, Weg M Vander, Schweizer ML, Jesson A, Morgan DJ, et al.

Establishing Evidence-Based Criteria for Directly Observed Hand Hygiene Compliance Monitoring Programs: A Prospective, Multicenter Cohort Study. *Infect Control Hosp Epidemiol.* 2014 Sep 1;35(9):1163–8.

33. Gould DJ, Moralejo D, Drey N, Chudleigh JH, Taljaard M. Interventions to improve hand hygiene compliance in patient care. *Cochrane Database Syst Rev.* 2017 Sep 1;9.
34. El-Saed A, Noushad S, Tannous E, Abdirizak F, Arabi Y, Al Azzam S, et al. Quantifying the Hawthorne effect using overt and covert observation of hand hygiene at a tertiary care hospital in Saudi Arabia. *Am J Infect Control.* 2018 Aug 1;46(8):930–5.
35. Polit DF, Beck CT. *Nursing research : generating and assessing evidence for nursing practice.* 2017.
36. Magnus TP, Marra AR, Camargo TZS, Victor E da S, da Costa LSS, Cardoso VJ, et al. Measuring hand hygiene compliance rates in different special care settings: a comparative study of methodologies. *Int J Infect Dis.* 2015 Apr 1;33:205-208.
37. Pincock T, Bernstein P, Warthman S, Holst E. Bundling hand hygiene interventions and measurement to decrease health care-associated infections. *Am J Infect Control.* 2012;40(4):18-27.
38. Martos-Cabrera MB, Mota-Romero E, Martos-García R, Gómez-Urquiza JL, Suleiman-Martos N, Albendín-García L, et al. Hand Hygiene Teaching Strategies among Nursing Staff: A Systematic Review. *Int J Environ Res Public Health.* 2019 Aug 2;16(17):3039.
39. Kesmodel US. Cross-sectional studies – what are they good for? Vol. 97, *Acta Obstet Gynecol Scand.* 2018;97(4):388–93.
40. Khaled Fahim N, Negida A. Sample Size Calculation Guide - Part 1: How to Calculate the Sample Size Based on the Prevalence Rate. *Adv J Emerg Med.* 2018;2(4):e50.
41. Zodpey SP. Sample size and power analysis in medical research. *Indian J Dermatol Venereol Leprol.* 2004 Mar 1;70(2):123–8.
42. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? *Indian J Psychol Med.* 2013;35(2):121–6.
43. Catalá-López F, Alonso-Arroyo A, Page MJ, Hutton B, Ridao M, Tabarés-Seisdedos R, et al. Reporting guidelines for health research: protocol for a cross-sectional analysis of the EQUATOR Network Library. *BMJ Open.* 2019;9(3):e022769.
44. Noordzij M, Dekker FW, Zoccali C, Jager KJ. Kidney Disease and Population Health: Sample size calculations. *Nephron - Clin Pract.* 2011;118(4):319–23.
45. Huis A, Schoonhoven L, Grol R, Borm G, Adang E, Hulscher M, et al. Helping hands: A cluster randomised trial to evaluate the effectiveness of two different strategies for promoting hand hygiene in hospital nurses. *Implement Sci.* 2011 Dec 3;6(1):101.
46. von Lengerke T, Lutze B, Krauth C, Lange K, Stahmeyer JT, Chaberny IF. Promoting Hand Hygiene Compliance. *Dtsch Arztebl Int.* 2017 Jan 20;114(3):29–36.
47. Ho M, Seto W, Wong L, Wong T. Effectiveness of multifaceted hand hygiene interventions in long-term care facilities in Hong Kong: a cluster-randomized controlled trial. *Infect Control Hosp Epidemiol.* 2012 Aug 2;33(8):761–7.

48. King D, Vlaev I, Everett-Thomas R, Fitzpatrick M, Darzi A, Birnbaum DJ. "Priming" hand hygiene compliance in clinical environments. *Health Psychol.* 2016 Jan;35(1):96–101.
49. Mertz D, Dafoe N, Walter SD, Brazil K, Loeb M. Effect of a multifaceted intervention on adherence to hand hygiene among healthcare workers: a cluster-randomized trial. *Infect Control Hosp Epidemiol.* 2010 Nov 2;31(11):1170–6.
50. Laskar AM, R D, Bhat P, Pottakkat B, Narayan S, Sastry AS, et al. A multimodal intervention to improve hand hygiene compliance in a tertiary care center. *Am J Infect Control.* 2018 Jul;46(7):775–80.
51. Stewardson AJ, Sax H, Gayet-Ageron A, Touveneau S, Longtin Y, Zingg W, et al. Enhanced performance feedback and patient participation to improve hand hygiene compliance of health-care workers in the setting of established multimodal promotion: a single-centre, cluster randomised controlled trial. *Lancet Infect Dis.* 2016 Dec;16(12):1345–55.
52. Lenglet A, van Deursen B, Viana R, Abubakar N, Hoare S, Murtala A, et al. Inclusion of Real-Time Hand Hygiene Observation and Feedback in a Multimodal Hand Hygiene Improvement Strategy in Low-Resource Settings. *JAMA Netw open.* 2019 Aug 2;2(8):e199118.
53. Sax H, Allegranzi B, Chraïti MN, Boyce J, Larson E, Pittet D. The World Health Organization hand hygiene observation method. *Am J Infect Control.* 2009;37(10):827–34.
54. Eckmanns T, Bessert J, Behnke M, Gastmeier P, Rüden H. Compliance With Antiseptic Hand Rub Use in Intensive Care Units The Hawthorne Effect. *Infect Control Hosp Epidemiol.* 2006;27(9):931–4.
55. Pittet D, Hugonnet S, Harbarth S, Mourouga P, Sauvan V, Touveneau S, et al. Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. *Lancet.* 2000 Oct;356(9238):1307–12.
56. Sax H, Allegranzi B, Chraïti M-N, Boyce J, Larson E, Pittet D. The World Health Organization hand hygiene observation method. *Am J Infect Control.* 2009 Dec;37(10):827-34.
57. RIVM. Hygiëneadviezen thuiszorg [Internet]. 2019 [cited 2019 Sep 23]. Available from: <https://www.rivm.nl/hygienerichtlijnen/hygieneadviezenhuiszorg>
58. RIVM. WIP-richtlijn Persoonlijke hygiëne [VWK] | RIVM [Internet]. [cited 2019 Oct 14]. Available from: <https://www.rivm.nl/documenten/wip-richtlijn-persoonlijke-hygiene-vwk>
59. Sax H, Allegranzi B, Uçkay I, Larson E, Boyce J, Pittet D. 'My five moments for hand hygiene': a user-centred design approach to understand, train, monitor and report hand hygiene. *J Hosp Infect.* 2007 Sep;67(1):9–21.
60. Pittet D. Hand Hygiene: It's All About When and How. *Infect Control Hosp Epidemiol.* 2008 Oct 2;29(10):957–9.
61. Shabot MM, Chassin MR, France A-C, Inurria J, Kendrick J, Schmaltz SP. Using the Targeted Solutions Tool® to Improve Hand Hygiene Compliance Is Associated with Decreased Health Care-Associated Infections. *Jt Comm J Qual patient Saf.* 2016 Jan;42(1):6–17.
62. Baek E-H, Kim S-E, Kim D-H, Cho O-H, Hong SI, Kim S. The Difference in Hand

Hygiene Compliance Rate Between Unit-based Observers and Trained Observers for WHO Checklist and Optimal Hand Hygiene. *Int J Infect Dis.* 2020;90:197-200.

63. Deschênes P, Chano F, Dionne L-L, Pittet D, Longtin Y. Efficacy of the World Health Organization-recommended handwashing technique and a modified washing technique to remove *Clostridium difficile* from hands. *Am J Infect Control.* 2017 Aug 1;45(8):844–8.
64. World Health Organization. WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge Clean Care Is Safer Care. 2009.
65. Pantein Zorggroep. Indicaties handhygiëne [Internet]. 2017 [cited 2019 Sep 18]. Available from: <https://infoland.pantein.nl/iProva/iDocument/Viewers/Frameworks/ViewDocument.aspx?DocumentID=6be237f1-cabc-4399-8bad-5538a5df3644&NavigationHistoryID=4840291&PortalID=137&Query=>
66. World Health Organization. WHO | Hand hygiene tools and resources [Internet]. World Health Organization; 2019 [cited 2019 Oct 3]. Available from: <https://www.who.int/infection-prevention/tools/hand-hygiene/en/>
67. Fagan; Mary J. Techniques to Improve Patient Safety in Hospitals. *JONA J Nurs Adm.* 2014;44(Supplement):S4–9.
68. Richter A, Chaberny IF, Surikow A, Schock B. Hygiene in medical education - increasing patient safety through the implementation of practical training in infection prevention. *GMS J Med Educ.* 2019;36(2).
69. Pittet D, Donaldson L. Clean Care is Safer Care: A worldwide priority. *Lancet.* 2005;366(9493):1246-47.
70. IBM Corp. IBM SPSS Statistics for Windows, Version 24.0. Armonk, New York: IBM Corp; 2016.
71. VSNU. Wetenschappelijke integriteit [Internet]. [cited 2019 Nov 7]. Available from: https://www.vsnul.nl/wetenschappelijke_integriteit.html
72. WMA. World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects [Internet]. 2008 [cited 2019 Oct 31]. Available from: <https://jamanetwork-com.proxy.library.uu.nl/journals/jama/fullarticle/1760318>
73. Zomer TP, Erasmus V, Looman CW, Van Beeck EF, Tjon-A-Tsien A, Richardus JH, et al. Improving hand hygiene compliance in child daycare centres: A randomized controlled trial. *Epidemiol Infect.* 2016 Sep 1;144(12):2552–60.
74. Allegranzi B, Gayet-Ageron A, Damani N, Bengaly L, Mclaws M-L, Moro M-L, et al. Global implementation of WHO's multimodal strategy for improvement of hand hygiene: a quasi-experimental study. *Lancet Infect Dis.* 2013;13(10):843-51.
75. Blanco Bezerra T, Marília ;, Valim D, Bortolini J, Ribeiro RP, Samira, et al. Adherence to hand hygiene in critical sectors: can we go on like this? *J Clin Nurs.* 2020;29(13-14):2691-8.
76. Moro ML, Morsillo F, Nascetti S, Parenti M, Allegranzi B, Pompa MG, et al. Determinants of success and sustainability of the WHO multimodal hand hygiene promotion campaign, Italy, 2007–2008 and 2014. *Eurosurveillance.* 2017 Jun 8;22(23).

77. Teesing GR, Erasmus V, Petrignani M, Koopmans MPG, de Graaf M, Vos MC, et al. Improving Hand Hygiene Compliance in Nursing Homes: Protocol for a Cluster Randomized Controlled Trial (HANDSOME Study). *JMIR Res Protoc*.2020;9(5):e17419.
78. Boyce JM, Pittet D. Guideline for Hand Hygiene in Health-Care Settings. Recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *Infect Control Hosp Epidemiol*. 2002;23(12 Suppl):3-40.
79. Widmer AF, Conzelmann M, Tomic M, Frei R, Stranden AM. Introducing Alcohol-Based Hand Rub for Hand Hygiene The Critical Need for Training. *Infect Control Hosp Epidemiol*. 2007 Jan;28(1):50-4.
80. Liu W-I, Liang S-Y, Wu S-FV, Chuang Y-H. Hand hygiene compliance among the nursing staff in freestanding nursing homes in Taiwan: A preliminary study. *Int J Nurs Pract*. 2014 Feb 1;20(1):46-52.
81. Lipsett PA, Swoboda SM. Handwashing compliance depends on professional status. *Surg Infect (Larchmt)*. 2001;2(3):241-5.
82. Vikke HS, Vittinghus S, Giebner M, Kolmos HJ, Smith K, Castrén M, et al. Compliance with hand hygiene in emergency medical services: An international observational study. *Emerg Med J*. 2019 Mar 1;36(3):171-5.
83. Emanuelsson L, Karlsson L, Castrén M, Lindström V. Ambulance personnel adherence to hygiene routines: Still protecting ourselves but not the patient. *Eur J Emerg Med*. 2013 Aug;20(4):281-5.
84. Ho JD, Ansari RK, Page D. Hand sanitization rates in an urban emergency medical services system. *J Emerg Med*. 2014;47(2):163-8.
85. Bledsoe BE, Sweeney RJ, Berkeley RP, Cole KT, Forred WJ, Johnson LD. EMS provider compliance with infection control recommendations is suboptimal. *Prehospital Emerg Care*. 2014;18(2):290-4.
86. Erasmus V, Brouwer W, van Beeck EF, Oenema A, Daha TJ, Richardus JH, et al. A Qualitative Exploration of Reasons for Poor Hand Hygiene Among Hospital Workers Lack of Positive Role Models and of Convincing Evidence That Hand Hygiene Prevents Cross-Infection. *Infect Control Hosp Epidemiol*. 2009 May;30(5):415-9.
87. Hoffmann M, Sendlhofer G, Gombotz V, Pregartner G, Zierler R, Schwarz C, et al. Hand hygiene compliance in intensive care units: An observational study. *Int J Nurs Pract*. 2020 Apr 1;26(2).
88. Carter EJ, Wyer P, Giglio J, Jia H, Nelson G, Kauari VE, et al. Environmental factors and their association with emergency department hand hygiene compliance: An observational study. *BMJ Qual Saf*. 2016 May 1;25(5):372-8.
89. Eiamsitrakoon T, Apisarnthanarak A, Nuallaong W, Khawcharoenporn T, Mundy LM. Hand hygiene behavior: translating behavioral research into infection control practice. *Infect Control Hosp*. 2013 Nov;34(11):1137-45.
90. Sundal JS, Aune AG, Storvig E, Aasland JK, Fjeldsæter KL, Torjuul K. The hand hygiene compliance of student nurses during clinical placements. *J Clin Nurs*. 2017 Dec 1;26(23-24):4646-53.
91. Willemsen I, Jefferson J, Mermel L, Kluytmans J. Comparison of infection control

- practices in a Dutch and US hospital using the infection risk scan (IRIS) method. *Am J Infect Control*. 2020 Apr 1;48(4):391–7.
92. Bhardwaj N, Khatri M, Bhardwaj SK, Sonne C, Deep A, Kim K-H. A review on mobile phones as bacterial reservoirs in healthcare environments and potential device decontamination approaches. *Environ Res*. 2020 Apr 21;186:109569.
 93. Ulger F, Dilek A, Esen S, Sunbul M, Leblebicioglu H. Are healthcare workers' mobile phones a potential source of nosocomial infections? Review of the literature. *J Infect Dev Ctries*. 2015;9(10):1046-53.
 94. Vandenbroucke JP, von Elm E, Altman DG, Gøtzsche PC, Mulrow CD, Pocock SJ, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): Explanation and elaboration. *Int J Surg*. 2014 Dec 1;12(12):1500–24.
 95. Gould DJ, Creedon S, Jeanes A, Drey NS, Chudleigh J, Moralejo D. I1. Gould DJ, Creedon S, Jeanes A, Drey NS, Chudleigh J, Moralejo D. Impact of observing hand hygiene in practice and research: a methodological reconsideration. *J Hosp Infect*. 2017 Feb 1;95(2):169-74.
 96. Lotfinejad N, Peters A, Pittet D. Hand hygiene and the novel coronavirus pandemic: The role of healthcare workers. *J Hosp Infect*. 2020 Mar 19;In Press.
 97. Hillier MD. Using effective hand hygiene practice to prevent and control infection. *Nurs Stand*. 2020 Apr 29;35(5):45–50.

Tables and figures

Table 1

Educational level – professional status

Profession	Educational level	general task description
<i>Nurse</i>	Level 5	High complex nursing and care - responsible for quality of care and expertise of the team - coaching colleagues - coordination of care - indicate
<i>Nurse</i>	Level 4	(Complex) nursing and care – coordination on patient-level
<i>Professional caregiver</i>	Level 3 IG	Low complex nursing, care and support – care plan
<i>Professional caregiver</i>	Level 3	Care and support

Table 2*Operationalization of parameters*

Hand hygiene opportunities	Hand hygiene technique	Personal hygiene	Mobile devices
<ul style="list-style-type: none">• Before contacting the patient.• After contacting the patient's environment.• Before clean/aseptic proceedings.• After contact with body fluids.• After using disposable gloves.	<ul style="list-style-type: none">• Rubbing hands with an alcohol based solution for more than 20 seconds.• Washing hands according to the 4 steps of the WHO: wetting hands, the use of liquid soap, rinse hands and dry hands with clean or single use towel.	<ul style="list-style-type: none">• Not wearing long sleeves.• The absence of long earrings and hand and wrist jewelry.• Wearing long hair in a tail or bun.• Not wearing nail polish, artificial nails and nails are cut short.• Wearing shoes that are easy to clean.• Wearing clean uniform every shift.	<ul style="list-style-type: none">• Only after the application of hand hygiene.• Not using phone or tablet during wearing personal protective equipment• When phone or tablet is used during moments of care, consider device as contaminated and clean immediately after use with an alcohol based cloth.

Table 3*Baseline characteristics*

Variable	Age category	n (%)
Respondents		22
Age	18-25	1 (4.5)
	26-35	0 (0.0)
	36-45	5 (22.7)
	46-55	11 (50.0)
	55+	5 (22.7)
Professional status	Nurse Level 5	5 (22.7)
	Nurse Level 4	6 (27.3)
	Professional caregiver 3IG	10 (45.5)
	Professional caregiver 3	1 (4.5)

Table 4*Results for individual participants*

	median	range	IQR
Percentage hand hygiene compliance	34	10 – 63	28
Number of opportunities per HCW	20	15 - 27	4

Table 5*Personal hygiene and device use*

		Professional status		
		Nurses (<i>n</i> = 11)	Professional caregivers (<i>n</i> = 11)	Total
Compliance with personal hygiene	Overall (%)	80.0	83.6	81.8
	Long sleeves ^a <i>n</i> (%)	7 (63.6)	6 (54.5)	13 (59.1)
	Jewelry ^b <i>n</i> (%)	2 (18.2)	1 (9.1)	3 (13.6)
	Long hair ^c <i>n</i> (%)	0 (0)	1 (9.1)	1 (4.5)
	Nails ^d <i>n</i> (%)	0 (0)	1 (9.1)	1 (4.5)
	Shoes ^e <i>n</i> (%)	2 (18.2)	0 (0)	2 (9.1)
Device correct use <i>n</i> (%)		15 (30.6)	10 (23.8)	25 (27.5)

^a Presence of long sleeves.^b Presence of long earrings and hand and wrist jewelry.^c Long hair not worn in a tail or bun.^d Presence of nail polish, artificial nails or long nails.^e Wearing shoes that are not easy to clean.

Figure 1

Hand hygiene compliance for individual participants

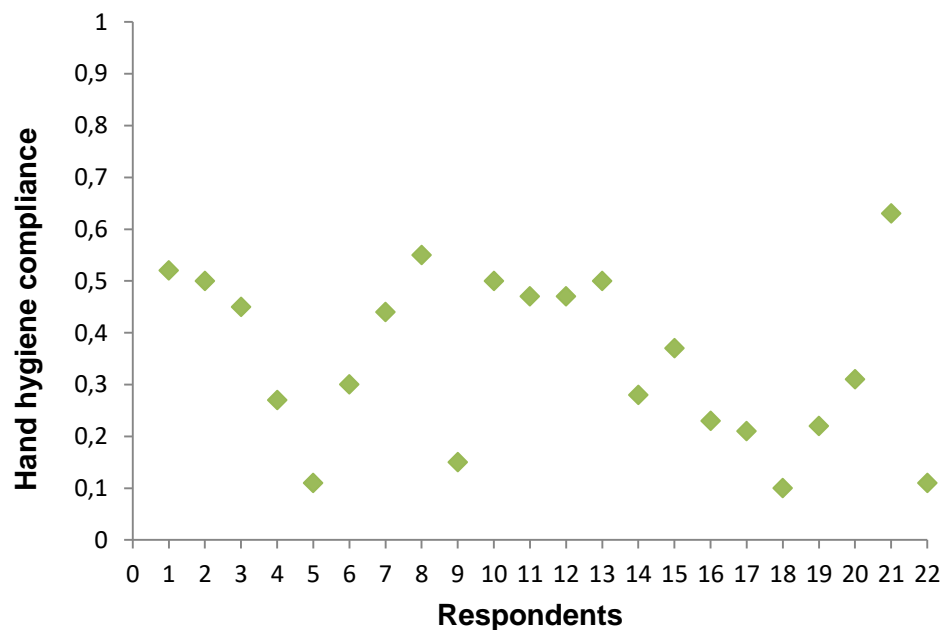


Figure 2

Compliance results

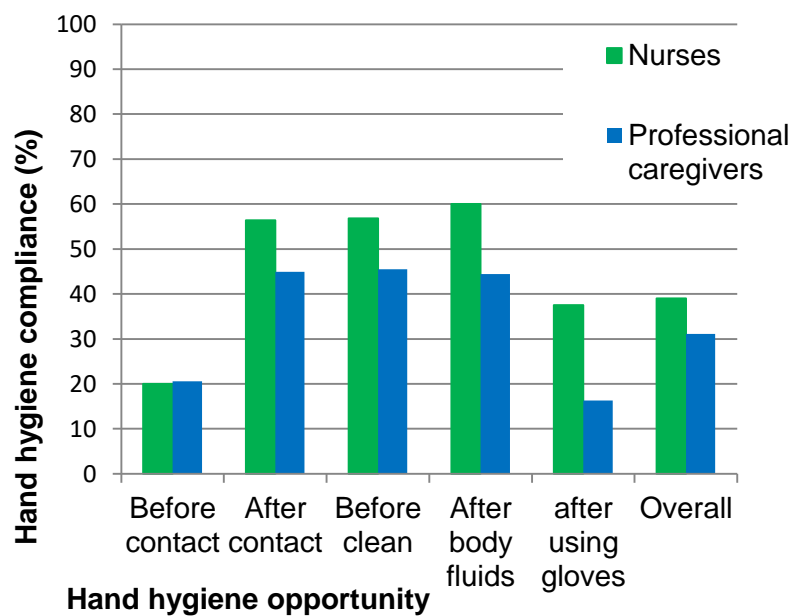
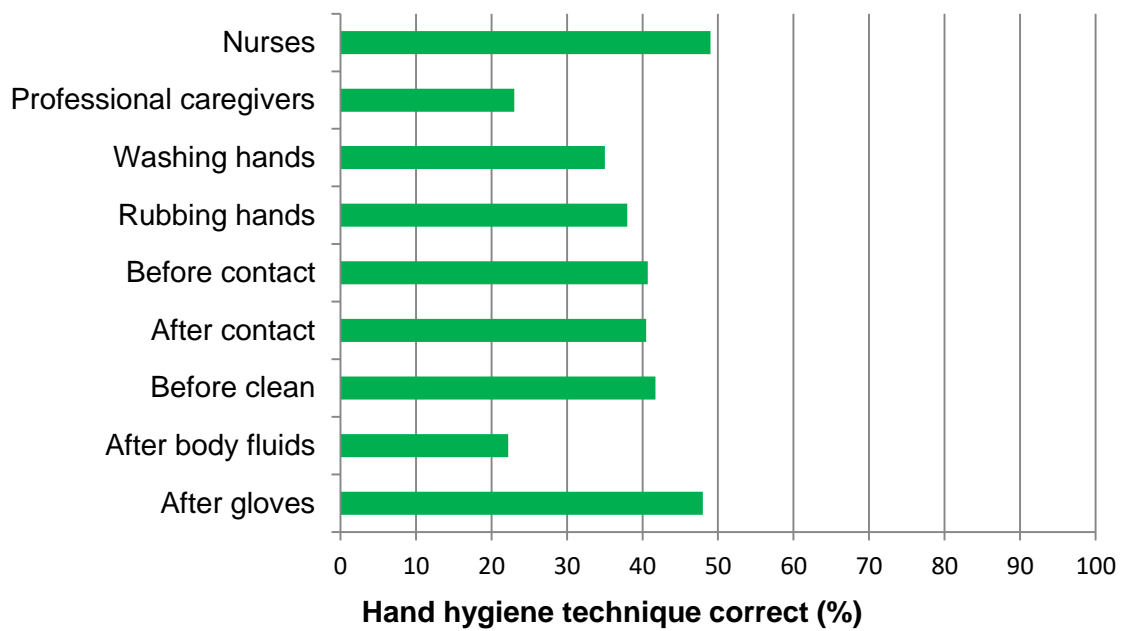


Figure 3

Technique results



Appendix A: observation form

Datum:

Participant nummer:

Demografische gegevens

Participant is: ☐ Verpleegkundige niveau 5

☐ Verpleegkundige niveau 4

☐ Verzorgende niveau 3 IG

☐ Verzorgende niveau 3

Leeftijd participant:

☐ 18-25

☐ 26-35

☐ 36-45

☐ 46-55

☐ 55+

Patiëntbezoek nummer van deze participant: 0 1 0 2 0 3 0 4 0 5 0 6 0 7

Medicatie

Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O	Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O	Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O	Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O
Cutaan	<input type="checkbox"/> nee	Cutaan	<input type="checkbox"/> nee	Cutaan	<input type="checkbox"/> nee	Cutaan	<input type="checkbox"/> nee
Supp	<input type="checkbox"/> ja <input type="checkbox"/> O	Supp	<input type="checkbox"/> ja <input type="checkbox"/> O	Supp	<input type="checkbox"/> ja <input type="checkbox"/> O	Supp	<input type="checkbox"/> ja <input type="checkbox"/> O
Sc	<input type="checkbox"/> nee	Sc	<input type="checkbox"/> nee	Sc	<input type="checkbox"/> nee	Sc	<input type="checkbox"/> nee
IV	<input type="checkbox"/> ja <input type="checkbox"/> O	IV	<input type="checkbox"/> ja <input type="checkbox"/> O	IV	<input type="checkbox"/> ja <input type="checkbox"/> O	IV	<input type="checkbox"/> ja <input type="checkbox"/> O
	<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee
	<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O
	<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee
	<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O
	<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee
Controle	<input type="checkbox"/> ja <input type="checkbox"/> O	Controle	<input type="checkbox"/> ja <input type="checkbox"/> O	Controle	<input type="checkbox"/> ja <input type="checkbox"/> O	Controle	<input type="checkbox"/> ja <input type="checkbox"/> O
	<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee
Registratie	<input type="checkbox"/> ja <input type="checkbox"/> O	Registratie	<input type="checkbox"/> ja <input type="checkbox"/> O	Registratie	<input type="checkbox"/> ja <input type="checkbox"/> O	Registratie	<input type="checkbox"/> ja <input type="checkbox"/> O
	<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee
Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O	Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O	Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O	Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O
Cutaan	<input type="checkbox"/> nee	Cutaan	<input type="checkbox"/> nee	Cutaan	<input type="checkbox"/> nee	Cutaan	<input type="checkbox"/> nee
Supp	<input type="checkbox"/> ja <input type="checkbox"/> O	Supp	<input type="checkbox"/> ja <input type="checkbox"/> O	Supp	<input type="checkbox"/> ja <input type="checkbox"/> O	Supp	<input type="checkbox"/> ja <input type="checkbox"/> O
Sc	<input type="checkbox"/> nee	Sc	<input type="checkbox"/> nee	Sc	<input type="checkbox"/> nee	Sc	<input type="checkbox"/> nee
IV	<input type="checkbox"/> ja <input type="checkbox"/> O	IV	<input type="checkbox"/> ja <input type="checkbox"/> O	IV	<input type="checkbox"/> ja <input type="checkbox"/> O	IV	<input type="checkbox"/> ja <input type="checkbox"/> O
	<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee
	<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O
	<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee
	<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O		<input type="checkbox"/> ja <input type="checkbox"/> O
	<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee
Controle	<input type="checkbox"/> ja <input type="checkbox"/> O	Controle	<input type="checkbox"/> ja <input type="checkbox"/> O	Controle	<input type="checkbox"/> ja <input type="checkbox"/> O	Controle	<input type="checkbox"/> ja <input type="checkbox"/> O
	<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee
Registratie	<input type="checkbox"/> ja <input type="checkbox"/> O	Registratie	<input type="checkbox"/> ja <input type="checkbox"/> O	Registratie	<input type="checkbox"/> ja <input type="checkbox"/> O	Registratie	<input type="checkbox"/> ja <input type="checkbox"/> O
	<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee		<input type="checkbox"/> nee
Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O	Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O	Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O	Oraal	<input type="checkbox"/> ja <input type="checkbox"/> O

Cutaan	nee	Cutaan	nee	Cutaan	nee	Cutaan	nee
Supp	O ja O	Supp	O ja O	Supp	O ja O	Supp	O ja O
Sc	nee	Sc	nee	Sc	nee	Sc	nee
IV	O ja O	IV	O ja O	IV	O ja O	IV	O ja O
	nee		nee		nee		nee
	O ja O		O ja O		O ja O		O ja O
	nee		nee		nee		nee
	O ja O		O ja O		O ja O		O ja O
	nee		nee		nee		nee
Controle	O ja O	Controle	O ja O	Controle	O ja O	Controle	O ja O
	nee		nee		nee		nee
Registratie	O ja O	Registratie	O ja O	Registratie	O ja O	Registratie	O ja O
	nee		nee		nee		nee

ONS

Voor zorg	O ja O nee
Na zorg	O ja O nee
Met klant	O ja O nee
Gebruik klinimetrie	O ja O nee
dossier compleet	O ja O nee
Vilans	O ja O nee

VPM

Is er sprake van VPM	O ja O nee	Volgens richtlijn 7831	O ja O nee
Opmerkingen			

AB

Is er sprake van AB	O ja O nee	Toedienvorm	O oraal O IV O overig
BRMO	O ja O nee	Maatregelen toegepast	O ja O nee

Persoonlijke hygiëne

Lange mouwen	O ja O nee
Sieraden ¹	O ja O nee
Los haar	O ja O nee
Nagellak ²	O ja O nee
Schoenen (niet makkelijk schoon te maken)	O ja O nee
Draag je iedere dag een schoon uniform	O ja O nee

1: lange oorbellen, hand- en polssieraden

2: nagellak, kunstnagels of lange nagels

Gebruik telefoon/tablet

*Indien tijdens zorgmoment gebruikt: nadien reinigen

Opp	Werkwijze	Correct	Opp	Werkwijze	Correct
1	HH vooraf O ja	O ja	2	HH vooraf O ja	O ja
	O nee			O nee	
	Reinigen* O ja	O nee		Reinigen* O ja	O nee
	O nee			O nee	
	X isolatie O ja			X isolatie O ja	
	O nee			O nee	
3	HH vooraf O ja	O ja	4	HH vooraf O ja	O ja
	O nee			O nee	
	Reinigen* O ja	O nee		Reinigen* O ja	O nee
	O nee			O nee	
	X isolatie O ja			X isolatie O ja	
	O nee			O nee	
5	HH vooraf O ja	O ja	6	HH vooraf O ja	O ja
	O nee			O nee	
	Reinigen* O ja	O nee		Reinigen* O ja	O nee
	O nee			O nee	
	X isolatie O ja			X isolatie O ja	
	O nee			O nee	
7	HH vooraf O ja	O ja	8	HH vooraf O ja	O ja
	O nee			O nee	
	Reinigen* O ja	O nee		Reinigen* O ja	O nee
	O nee			O nee	
	X isolatie O ja			X isolatie O ja	
	O nee			O nee	
9	HH vooraf O ja	O ja	10	HH vooraf O ja	O ja
	O nee			O nee	
	Reinigen* O ja	O nee		Reinigen* O ja	O nee
	O nee			O nee	
	X isolatie O ja			X isolatie O ja	
	O nee			O nee	
11	HH vooraf O ja	O ja	12	HH vooraf O ja	O ja
	O nee			O nee	
	Reinigen* O ja	O nee		Reinigen* O ja	O nee
	O nee			O nee	
	X isolatie O ja			X isolatie O ja	

	O nee			O nee	
--	-------	--	--	-------	--

Hand hygiene

3: handen natmaken, vloeibare zeep gebruiken, handen wassen en handen drogen met schone of wegwerp handdoek

Opp	Indicatie	Actie	Techniek	Opp	Indicatie	Actie	Techniek
1	O voor contact	O geen		2	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee		O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee
	O voor schoon	O desinfectie	Langer dan 20 seconden O ja O nee		O voor schoon	O desinfectie	Langer dan 20 seconden O ja O nee
	O na vloeistof O na handsch				O na vloeistof O na handsch		
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
3	O voor contact	O geen		4	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee		O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee
	O voor schoon	O desinfectie	Langer dan 20 seconden O ja O nee		O voor schoon	O desinfectie	Langer dan 20 seconden O ja O nee
	O na vloeistof O na handsch				O na vloeistof O na handsch		
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
5	O voor contact	O geen		6	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee		O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee
	O voor schoon	O desinfectie	Langer dan 20 seconden O ja O nee		O voor schoon	O desinfectie	Langer dan 20 seconden O ja O nee
	O na vloeistof O na handsch				O na vloeistof O na handsch		

Opp	Indicatie	Actie	Techniek	Opp	Indicatie	Actie	Techniek
7	O voor contact	O geen		8	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee		O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee
	O voor schoon	O desinfectie	Langer dan 20 seconden O ja O nee		O voor schoon	O desinfectie	Langer dan 20 seconden O ja O nee
	O na vloeistof O na handsch				O na vloeistof O na handsch		
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
9	O voor contact	O geen		10	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee		O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee
	O voor schoon	O desinfectie	Langer dan 20 seconden O ja O nee		O voor schoon	O desinfectie	Langer dan 20 seconden O ja O nee
	O na vloeistof O na handsch				O na vloeistof O na handsch		
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
11	O voor contact	O geen		12	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³

	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee

Opp	Indicatie	Actie	Techniek	Opp	Indicatie	Actie	Techniek
13	O voor contact	O geen		14	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
15	O voor contact	O geen		16	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
17	O voor contact	O geen		18	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee

Opp	Indicatie	Actie	Techniek	Opp	Indicatie	Actie	Techniek
19	O voor contact	O geen		20	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
21	O voor contact	O geen		22	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
	O voor contact	O geen			O voor contact	O geen	

23	O na cont/omg	O wassen	4 stappen doorlopen ³	24	O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	seconden		O na handsch		O ja O nee
			O ja O nee				

Opp	Indicatie	Actie	Techniek	Opp	Indicatie	Actie	Techniek
25	O voor contact	O geen		26	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	seconden		O na handsch		O ja O nee
			O ja O nee				
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
27	O voor contact	O geen		28	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	seconden		O na handsch		O ja O nee
			O ja O nee				
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
29	O voor contact	O geen		30	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	seconden		O na handsch		O ja O nee
			O ja O nee				

Opp	Indicatie	Actie	Techniek	Opp	Indicatie	Actie	Techniek
31	O voor contact	O geen		32	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	seconden		O na handsch		O ja O nee
			O ja O nee				
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
33	O voor contact	O geen		34	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	seconden		O na handsch		O ja O nee
			O ja O nee				
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek

35	O voor contact	O geen		36	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee

Opp	Indicatie	Actie	Techniek	Opp	Indicatie	Actie	Techniek
37	O voor contact	O geen		38	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
39	O voor contact	O geen		40	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
41	O voor contact	O geen		42	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee

Opp	Indicatie	Actie	Techniek	Opp	Indicatie	Actie	Techniek
43	O voor contact	O geen		44	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
45	O voor contact	O geen		46	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³		O na cont/omg	O wassen	4 stappen doorlopen ³
	O voor schoon		O ja O nee		O voor schoon		O ja O nee
	O na vloeistof	O	Langer dan 20 seconden		O na vloeistof	O desinfectie	Langer dan 20 seconden
	O na handsch	desinfectie	O ja O nee		O na handsch		O ja O nee

	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
47	O voor contact	O geen		48	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee		O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee
	O voor schoon				O voor schoon		
	O na vloeistof	O	Langer dan 20 seconden O ja O nee		O na vloeistof	O desinfectie	Langer dan 20 seconden O ja O nee
	O na handsch	desinfectie			O na handsch		

Opp	Indicatie	Actie	Techniek	Opp	Indicatie	Actie	Techniek
49	O voor contact	O geen		50	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee		O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee
	O voor schoon				O voor schoon		
	O na vloeistof	O	Langer dan 20 seconden O ja O nee		O na vloeistof	O desinfectie	Langer dan 20 seconden O ja O nee
	O na handsch	desinfectie			O na handsch		
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
51	O voor contact	O geen		52	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee		O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee
	O voor schoon				O voor schoon		
	O na vloeistof	O	Langer dan 20 seconden O ja O nee		O na vloeistof	O desinfectie	Langer dan 20 seconden O ja O nee
	O na handsch	desinfectie			O na handsch		
	Indicatie	Actie	Techniek		Indicatie	Actie	Techniek
53	O voor contact	O geen		54	O voor contact	O geen	
	O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee		O na cont/omg	O wassen	4 stappen doorlopen ³ O ja O nee
	O voor schoon				O voor schoon		
	O na vloeistof	O	Langer dan 20 seconden O ja O nee		O na vloeistof	O desinfectie	Langer dan 20 seconden O ja O nee
	O na handsch	desinfectie			O na handsch		