

# Målbart bedre Håndhygiejne



# Manglende håndhygiejne er et vedvarende problem

20%

af alle HAI kan forhindres med god håndhygiejne. 18%

er den gennemsnitlige compliance blandt sundhedspersonale på plejehjem. 10%

af alle borgere på plejehjem har en infektion.



# You can't improve what you don't measure.

Quality improvement expert - W. Edwards Deming

How you measure is important. If your measurement is off, your improvement will also be.

# Upålidelige data fra direkte observationer



Hawthorne effekt

Gør at compliance data overestimeres med 55%



Insignifikant data

Selv med ugentlige observationer måles <0,01% af alle situationer



Begrænset indblik

Flere hygiejne situationer er umulige at måle, så som toiletter

### Viden redder liv

### Forstå jeres kultur

Hvor jeres forbedringsarbejde har den største effekt på håndhygiejnen

### Fokuser hvor der er behov

Udvælg de vigtige områder, som I ønsker at holde specielt øje med

### Dokumenter jeres succes

Automatisk dokumentation of forbedringsarbejdet gør at I kan fokusere på værdiskabende arbejde.



# Beboer besøg



### Interaktion

En Sani sensor placeres ved indgangen og skaber en usynlig "clean zone" i boligen.

Flere sensorer kan opsættes, hvis man ønsker at adskille områder i boligen



## Sani ID



### Sani ID

En Sani ID sættes nemt på de nuværende navneskilte. Data indsamles anonymt og på gruppeniveau.



# Dispenser forbrug



### Målinger

En sensor påsættes alle nuværende sprit- og sæbedispensere og registrerer anvendelse.

Hvordan: Hver gang en dispenser anvendes, er det nærmeste ansatte, som krediteres for anvendelsen.



# Hurtig og nem implementering

Systemet er nemt at installere og gøres uden at forstyrre beboere og personale.





### 3 timers installation

Det tager 3 timer at installere en afdeling med 30 boliger.



### 2 års batterilevetid

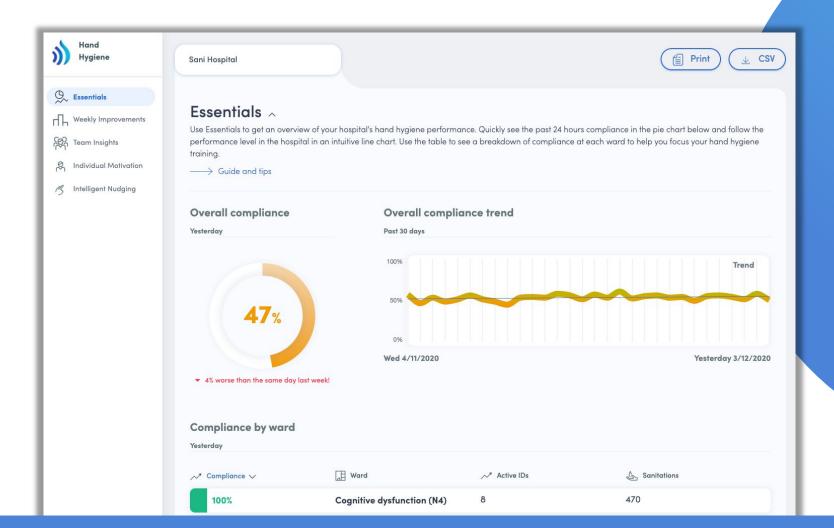
Alle sensorer har en batterilevetid på 2 år og bruger standard AA-batterier.

### Ingen vedligeholdelse

Systemet sender automatisk besked, hvis en sensor går i stykker.

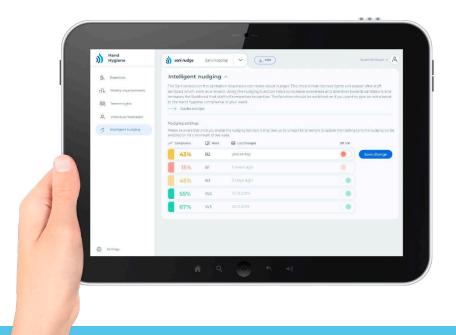
### Dashboard

Få hurtigt et overblik over hvor der er brug for hjælp og hvor I kan lære fra.



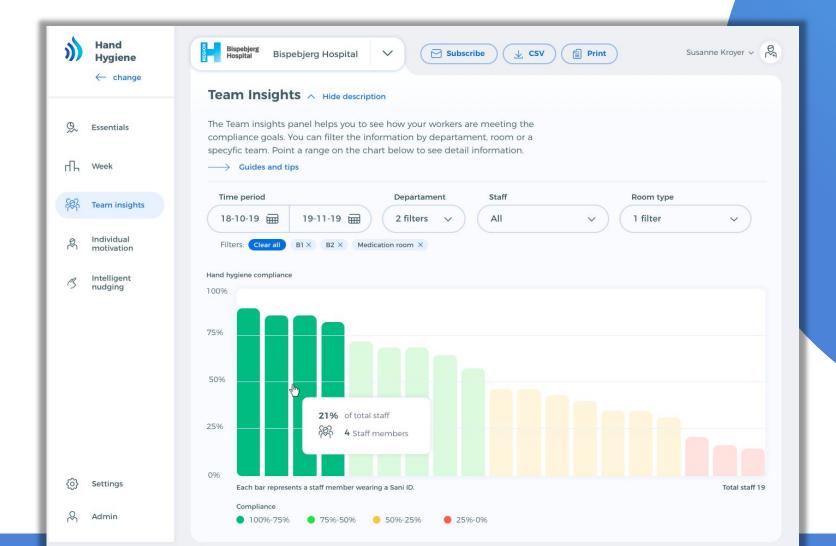
# Intelligent Nudging

Giv ansatte et lille skub I den rigtige retning efter behov.





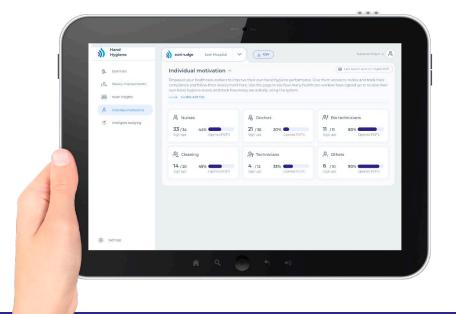
# Team indsigt



Alle er ikke ens, og det er vigtigt at forstå forskelligheden, når man laver forbedringsarbejde.

# Anonymt men personligt

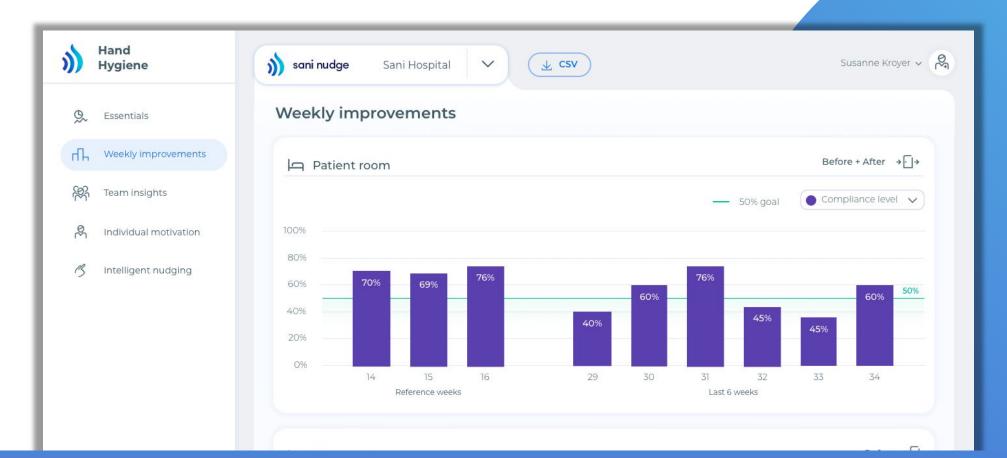
Ansatte kan se hvor gode de er til at udføre håndhygiejne uden at de behøver dele det med andre.





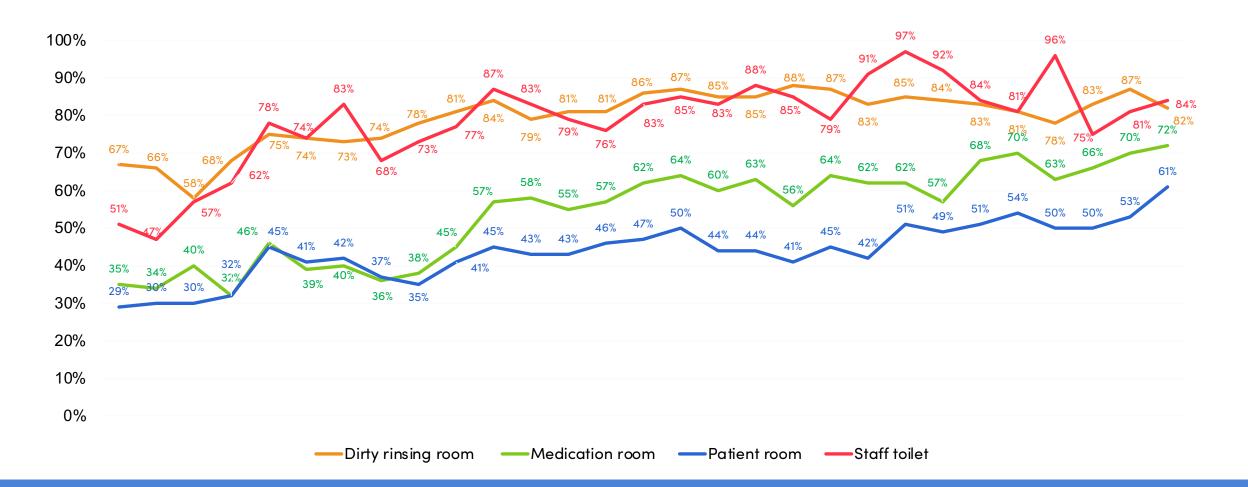
## Bare 10 minutter hver uge

Ved at tale om håndhygiejne på ugentlige tavlemøder, får alle en forståelse for barrierer for håndhygiejne og kan blive motiveret af deres samlede forbedring.



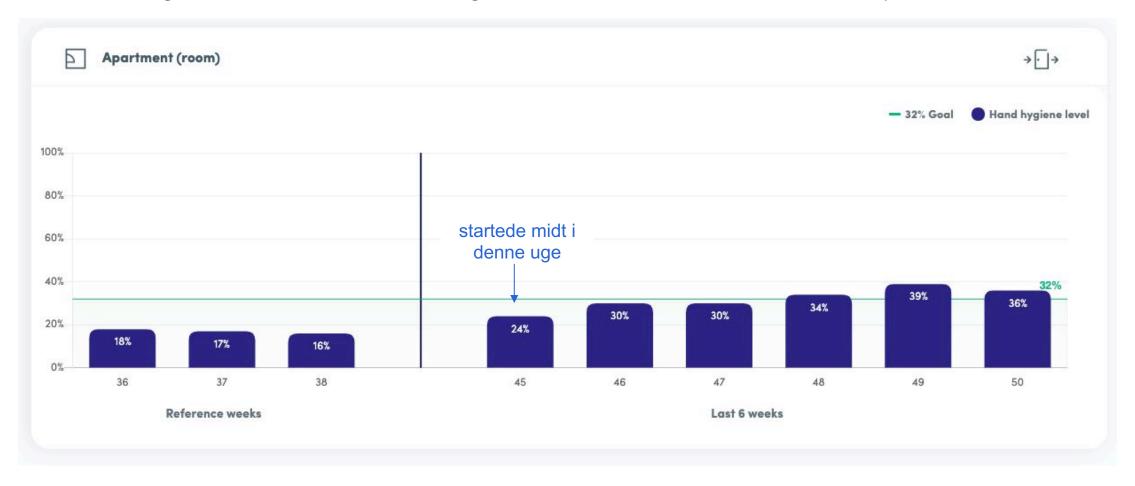
### Det virker!

Alt efter hvor meget fokus der er på håndhygiejne ser vi typisk en fordobling i compliance over 12 måneder.



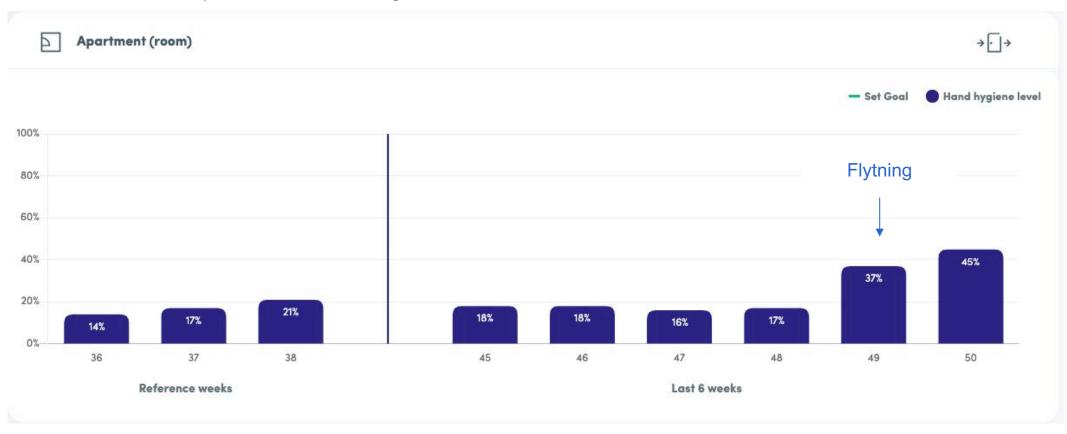
## Resultater fra plejehjem

Forbedring ses allerede fra første uge, hvor resultater bliver delt med personalet.



# Flytning af dispensere på plejehjem

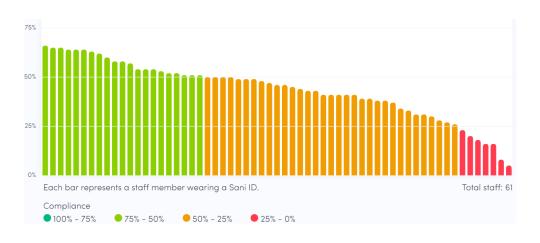
En barriere er tilgængelighed. Flytning af dispensere til indgangsparti i hver bolig fordoblede compliance hos borgerne.



# Forbedring på tværs af alle ansatte

Alle får et løft så smittekæden brydes.

### Baseline



### 3 måneders forbedringsarbejde



IN THE ORTHOPEDIC DEPARTMENT (M4), THE SANI NUDGE SYSTEM IS INSTALLED AND USED AS A "I SYSTEM TO MONITOR THE HAND HYGIENE OF STAFF. DATA ARE COLLECTED VIA SENSORS AND IS SUBSEQUENTLY DISCUSSED AT STAFF MEETINGS IN O BEHAVIOUR AND IMPROVE HAND HYGIENE COMPLIANCE.

### Data collection

The sensors are placed on the staff name badges, above the patient beds and on alcohol dispensers.

During the first period, data from the Sani nudge system was validated up against direct observations and video

After a test period, staff and the department head nurse defined some clear goals and expectations. Effort to reach these goals was achieved via increased focus on hand hygiene, education and an open dialogue

Staff data was anonymized. Data presented at meetings reflected the average compliance of the department.

When the baseline stopped, we were educated in hand hygiene by the hygiene organization which was followed by weekly staff meetings with data presentation and team reflection

The reason for the decline of compliance during some periods was also discussed and use to improve behavior

### Håndhygiejne - Skyllerum URENT M4

The Capital Region of Denmark

midt

Rigshospitalet Infektionshygiejnisk Enhed

### Er hospitalsinfektioner problem end hidtil antac

Hansen MB, MD PhD, Rigshospitalet

Iversen A. Klinisk synenleiesnerialist. Aarhus Universitetshosnita Minter I Sekretariatschef, Rådet for Bedre Hygiejne

Egholm M, Ingeniør, Konduto

Hospitalsinfektioner medfører store omkostninger både økonomiske, men også samfundsmæssige og menneskelige i form af sygefravær, genoptræning og invalidering

Hospitalsinfektioner udgør en væsentlig sundhedstrussel, da de forårssager 37.000 dødsfald i Europa og 99.000 dødsfald årligt i USA2, hvilket placerer dem på top 5-listen over hyppigste årsager til dødsfald og koster flere menneskeliv end AIDS. brystkræft og motorkøretøjsulykker tilsammen3.

Der er sket en seksdobling i antallet af multiresistente bakterier siden 2012<sup>4</sup>. Herudover vil antallet af danskere over 70 år næsten være fordoblet om 20 år, hvilket gør problematikken højaktuel, da denne gruppe bruger dobbelt så mange sundhedsydelse som folk, der er 50 år

Undersøg herunder

### Automated hand hygiene monitoring increases the understanding of poor compliance beh A prospective observational study

Anne-Mette Iversen<sup>1</sup>, Camilla R. Lauridsen<sup>1</sup>, Rosa Hansen<sup>2</sup>, Biørn Hesselbo<sup>3</sup>, Rebekah Alexander<sup>4</sup>, Aaron Alex<sup>4</sup>, Marco B. Hansen<sup>4</sup>, Christiane P. Kavalaris<sup>3</sup>

### INTRODUCTION

Hospital-acquired infections and spread of antimicrobial resistance can be reduced by improving hand hygiene compliance (HHC) among healthcare workers (HCWs). However, low HHC at hospitals remains a problem and good monitoring methods are needed.

### **OBJECTIVES**

We aimed to describe our experiences using a real-time automated hand hygiene monitoring system.



The staff says:

"It does not feel like surveilland

"It was motivating to see the re

"It was nice to be able to discu concrete situations, and in that

Open dialogue about be

Clear improvement in co

- The results helped to ide

were not placed optimal

we move to other places

improved complian

and habits.

and was a true eve opener

An automated HHC monitoring system (Sani nudgeTM)a was installed at two Danish hospital wards between February 2018 and September 2018.

The system constantly monitored staff hygiene behaviour using sensors located on staff name tags, patient beds and sanitizers (Figure 1). Specially designed algorithms based on the WHO's '5 Moments for Hand Hygiene' and local hospital guidelines were used to calculate the HHC levels.

A patient clean zone around each bed was created by the sensors and used to register whether hand hygiene was performed before and after natient contact. In the patient rooms, the WHO moments 1, 4 and 5 were measured. The system has been validated and compared with direct observations. Only alcoholbased hand disinfection was measured.

doctors, n=6) involved, the system registered 2.2 million data points equating to 127,601 direct observations and a mean HHC of 46%.

often sanitized hands after (mean 35%)

became smaller as the HCWs worked with the data from the fully integrated system and a general upward trend could be seen achieving HHC levels as high as 93% in staff toilets.



fer storage of clean goods). DR, darly missing room (slates room for solded goods). R. Istobem, M. medication room, O. office, PR. I. patient room (1 bed); PR. 2, patient room (2 beds); PR. 3, patient room (3 beds); PT, patient toilet, SR, storeroom. ST. staff toilet.

### Improve Hand Hygiene Behavior with the Sani Nudge System

Measure patient contact precisely and identify poor compliance behavior.



Automated hand hygiene monitoring increases the understanding of poor compliance behavior: A prospective observational study

Iversen AM<sup>1</sup>, Lauridsen CR<sup>1</sup>, Hansen R<sup>2</sup>, Hesselbo B<sup>2</sup>, Alexander R<sup>3</sup>, Hansen MB<sup>3</sup>, Kavalaris CP<sup>2</sup> <sup>1</sup>Aarhus University Hospital, Denmark, <sup>2</sup>Bispebjerg University Hospital, Denmark, <sup>3</sup>Konduto ApS, Sani nudge, Copenhagen, Denmark

Low hand hygiene compliance (HHC) at

Hansen MB. MD PhD. sani nudge

■ RACKGROUND

 The system registered 2.2 million data Is it time to rethink hand hygiene monitoring?

Infection Control Nurse, Bispebjerg University Hospital • Stangerup M, Infection Control Nurse, Bispebjerg University Hospital • Hansen R, Charge

AUTHORS: Iversen AM, Clinical Nurse Specialist, Aarhus University Hospital - Lauridsen CR, RN, Aarhus University Hospital - Kavalaris CP,

Nurse, Bispebjerg University Hospital - Hesselbo B, Senior Consultant, Bispebjerg University Hospital - Alexander R, MSc, PhD, sani nudge -

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Losso J. L. et al (2017) Providing hose converse vascidated infection through human factor expiracing fourest polision in Heriotisc. Diseases Vii. 31, Et a., 9233-339.

Losso J. L. et al (2017) Providing hose converse vascidated infection through human factors expiracing fourest polision in Heriotisc. A page 323-339.

Schelbhauer S. et al (2018) CWP Hoses of hard hygiene diseases replaced increase hand hygiene compliance? American Journal of Infection Concretion 46, is. 30, Pp 1129-115.

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Schelbhauer S. et al. (2018) CWP Hoses of hard hygiene diseases hand hygiene compliance? American Journal of Infection Concretion 46, is. 30, Pp 1129-115.

Bispebjerg and Frederiksberg Hospitals, Denmark

### Can automated hand hygiene monitoring improve compliance?

AUTOMATED HAND HYGIENE MONITORING INCREASES THE

M. B. Hansen<sup>1</sup>, A.-M. Iversen<sup>2</sup>, C. R. Lauridsen<sup>2</sup>, R. Hansen<sup>3</sup>, B. Hesselbo<sup>4</sup>,

University Hospital, Aarhus; <sup>3</sup>Department of Orthopedic; <sup>4</sup>Department of

Introduction: Low hand hygiene compliance (HHC) at hospitals

Objectives: We aimed to asses HHC and describe our experiences

Methods: An automated HHC monitoring system (Sani nudge™)<sup>1</sup> was

installed at two Danish hospital wards between Feb 2018 and Sep

2018. The system constantly monitored staff hygiene behaviour

using sensors located on staff name tags, patient beds and sanitizers.

Specially designed algorithms based on the WHO's '5 Moments for

Hand Hygiene' and local hospital guidelines were used to calculate

the HHC levels. The system has been validated and compared with

UNDERSTANDING OF POOR COMPLIANCE BEHAVIOUR: A

<sup>1</sup>Konduto ApS, Copenhagen; <sup>2</sup>Department of Oncology, Aarhus

Antimicrobial Resistance and Infection Control 2019, 8(Suppl 1):P407

remains a problem and good monitoring methods are needed.

using a real-time automated hand hygiene monitoring system.

Quality and Education, Bispebjerg University Hospital, Copenhagen,

PROSPECTIVE OBSERVATIONAL STUDY

R. Alexander<sup>1</sup>, C. P. Kavalaris<sup>4</sup>

Correspondence: M. B. Hansen

Hand hygiene is one of the most important tools to prevent transmission of pathogens.

ect observation is a common method used but limited by the Hawthorne effect and inter-observer bias.

Sani nudge is an electronic monitoring system developed as part of a national innovation collaboration between Bispebierg and Frederiksberg Hospitals. Denmark and Sani nudge.

We aimed to investigate the effect of nudging and data-driven performance feedback on the compliance levels.



 In total 116 347 observations were registered with an average baseline compliance of 47%. All rooms (not patient rooms): The compliance increased from 39% to 52% (phase 2) and further to 66% (phase 3) and 71% (phase 4).

> . In the patient rooms, compliance was lower but increased from 28% to 46% (median).

When only looking at nurses receiving individual

continuously using sensors placed on the staff name tag at the patient beds and on existing soap- and alcoho Data was available on team level (stratified by profession)

individual level and according to room type.

The sensor algorithms are based on the WHOs "5

Moments for Hand Hygiene" but local guidelines could Data was provided by Sani nudge and the Data Unit of the

From the beginning of the study, it was decided that all individual compliance level (chase 4) had data send

The study was divided into 4 phases:

directly to them in a secured way

1. Baseline period

Nudging (discrete visual lights appearing on sensors Nudoing and weekly data presentation meetings.

4. Nudging, weekly meetings and individual data (voluntee



### CONCLUSION

Hand hygiene compliance increases with nudging and data-driven performance feedback, especially when data is presented on weekly team meetings.

The staff, whom by the end of the study received individualized data, increased compliance even further. The electronic monitoring system is a good method to increase compliance and the data-driven approach provides the hospital with non-biased, real-time data which nelps the hospitals to identify critical areas with low

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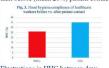
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With 79 staff members (nurses n=73-

There was a disparity in HHC rates across room types with the lowest HHC in patient bedrooms (mean 36%) and the highest in staff toilets (mean 80%) (Figure 2).

### **RESULTS II**

In the patient bedrooms, the staff more than before (mean 26%) patient contact.



Fluctuations in HHC between days

information

approach p

Health (J. no. MBH is co-fou

### A total of 79 staff members (nurses, n=73; doctors, n=6) were taking part in the project. The majority of ID-sensors were given to nurses because they work routhey in the words and have high number of patient interactione which enabled the study to examine the hygiene behavior according to daily ward activity. During the study period, the system registered 2.2 million data points equating to 127,601 direct observations and an average HHC of 46%. Interestingly, most patient contacts occurred from Sam to 2pm, but the lowest HHC was between 9pr

Low hand hygiene compliance (HHC) at hospitals continues to be a problem and

Low hand hygiene compliance (HHL) at hospitals continues to be a problem and the accuracy of HHC monitoring is still a challenge. Direct observation of hand hygiene is standard practice but is limited by the Hawthorne effect and interob-server variation?, In addition, the method is time consuming, labor intensive and

There have been many significant improvements in technologies over the years, but the healthcare sector has not exploited these opportunities. Automatic monitoring of HILGs now possible and allows continuous data collection and analysis. Importantly, the Hawthorne effect is mitigated and required human resources are miniman.

DUBLE LIVE
The first important step to improve HHC is to get insight into data, trends and behavior. Therefore, we aimed to monitor HHC using a real-time location system specifically designed for hospitals (sani nudge")5. In addition, we aimed to look in different cituations where HHC was particularly low and work with hospital staff.

MR. HAU.

The sain udge system" was installed at two loopital wards and used sensors to monitor sanitizations (Fig. 1). In addition, specifically designed algorithms, based on MPG'S is moment for Haufth lygiene and look plought goldenies and practices were used to calculate the HAU. The system madrow WHO moments 1, 4 and 5. The daily bereful HAU was recorded on a continue 24-hor takes between February 2013 and September 2013. This study focused on hand hygiene using all allothe based is allother Based is allother Based is allother.

cantures only a fraction of the total hand business events

bedrooms, the hospital staff had a higher tendency to sanitize hands after patien contact rather than before patient contact (Fig. 2). In line with this, we found that HHC was highest in rooms that were often considered dirty (Fig. 3). For example, here was a lower HHC in the medicine room (Fig. 3a) compared with staff toile (Fig. 3b) and rinsing room (Fig. 3c).

We found that with the system fully integrated, the hospital staff worked to main tain a constant level of good hand hygiene (Fig. 3d). Fluctuations in HHC rates be tween days became smaller and a general upward trend could be seen. In addition, rooms that had low HHC at the start of the study, such as staff toilets, improved to

By using this monitoring system, instead of direct observation, this study can als look at HHC in all rooms at the same time using a heatman (FIg. 4). The heatma provides an overview of rooms with high vs. low HHC, thus helping the wards and hygiene nurses to direct the resources to where it is most needed

HHC can successfully be monitored using a computerized system. Interestingly we found the lowest HHC during late evening/night and in patient bedrooms, especially before patient contact. This data-driven approach enables hospitals to have precise, accurate and real-time compliance rates and gives important insigh nto hygiene behaviors and helps identify areas that need to be improved. As a es uit italioned by niene campaigns can be created that specifically address thes as In future studies, we will use the system to investigate HHC of national

### Figure 3b: Hand hygiene compliance in staff Figure 3a: Hand hygiene compliance in the Figure 3d: Total hand hygiene compliance in the whole ward

Figure 2. Hand hyplene compliance in patient bedrooms stratified according to patient contact









# Nyeste studier



Iversen Am et al. Clinical experiences with a new system for automated hand hygiene monitoring: A prospective observational study. Am J Infect Control. 2020 May;48(5):527-533.

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Online ahead of print.

Assessing the clinical accuracy of a hand hygiene

> Am J Infect Control. 2021 Jan 13:S0196-6553(21)00006-7. doi: 10.1016/i.aiic.2021.01.006.

### Assessing the clinical accuracy of a hand hygieno system: Learnings from a validation study

Marco Bo Hansen <sup>1</sup>, Nina Wismath <sup>2</sup>, Evelyn Fritz <sup>2</sup>, Alexandra Heininger <sup>2</sup>

Affiliations + expand

PMID: 33450308 DOI: 10.1016/i.aiic.2021.01.006

### Abstract

There is a need to establish validation standards that allow for comparison of automated hand hygiene systems. To assess the accuracy of an innovative monitoring tool (Sani nudge), 2 test nurses performed clinical standard tasks while being observed by 2 infection preventionists. Data from the direct observations were compared with data obtained from the hand hygiene system (Sani nudge) using an independent-event approach. We identified 54 true-positive events (100% system accuracy) and 4 true-negative events (100% system accuracy). No false-positive or false-negative events were identified. We found this approach to be feasible and clinically useful to validate hand hygiene systems in the future.

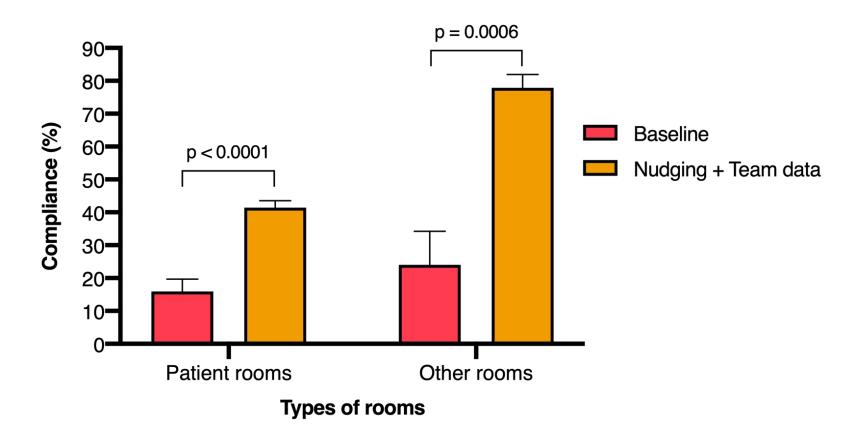
**Keywords:** Compliance; Electronic monitoring; Healthcare-acquired; Infection prevention; Nudging; Reminder systems.

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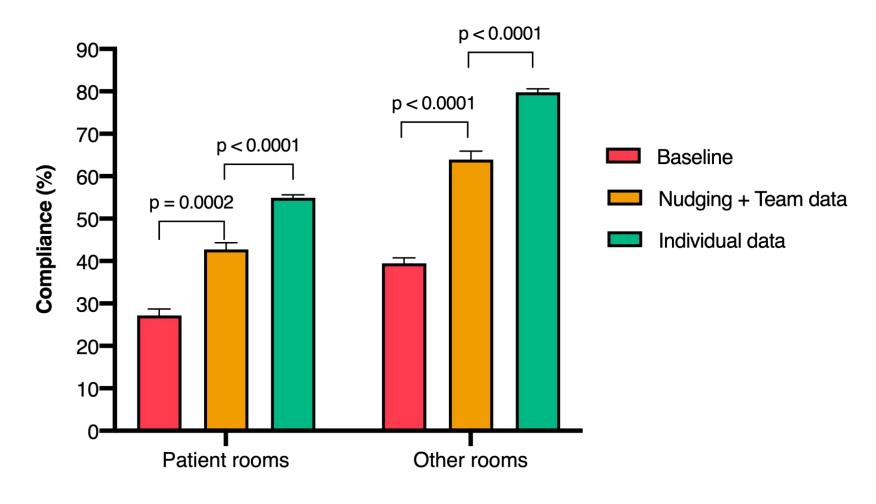
Hansen et al. Assesing the clinical accuracy of a hand hygiene system: Learnings from a validation study. Am J Infect Control. 2021 Jan 13; S0196–6553(21)00006–7.

Knudsen et al. Light-guided nudging and data-driven performance feedback improve hand hygiene compliance among nurses and doctors. Am J Infect Control. 2020 Nov 10;S0196-6553(20)30991-3.

# Compliance for læger



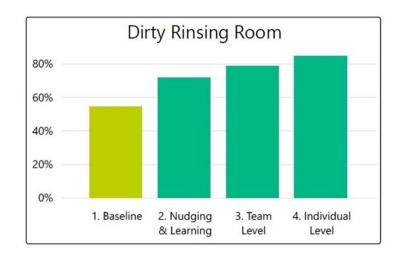
# Compliance for sygeplejesker

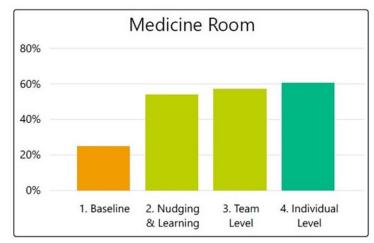


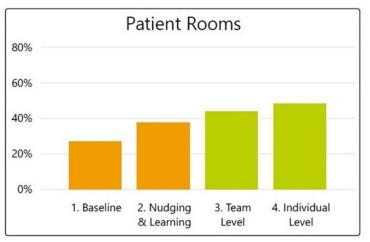
# Forbedring på alle områder

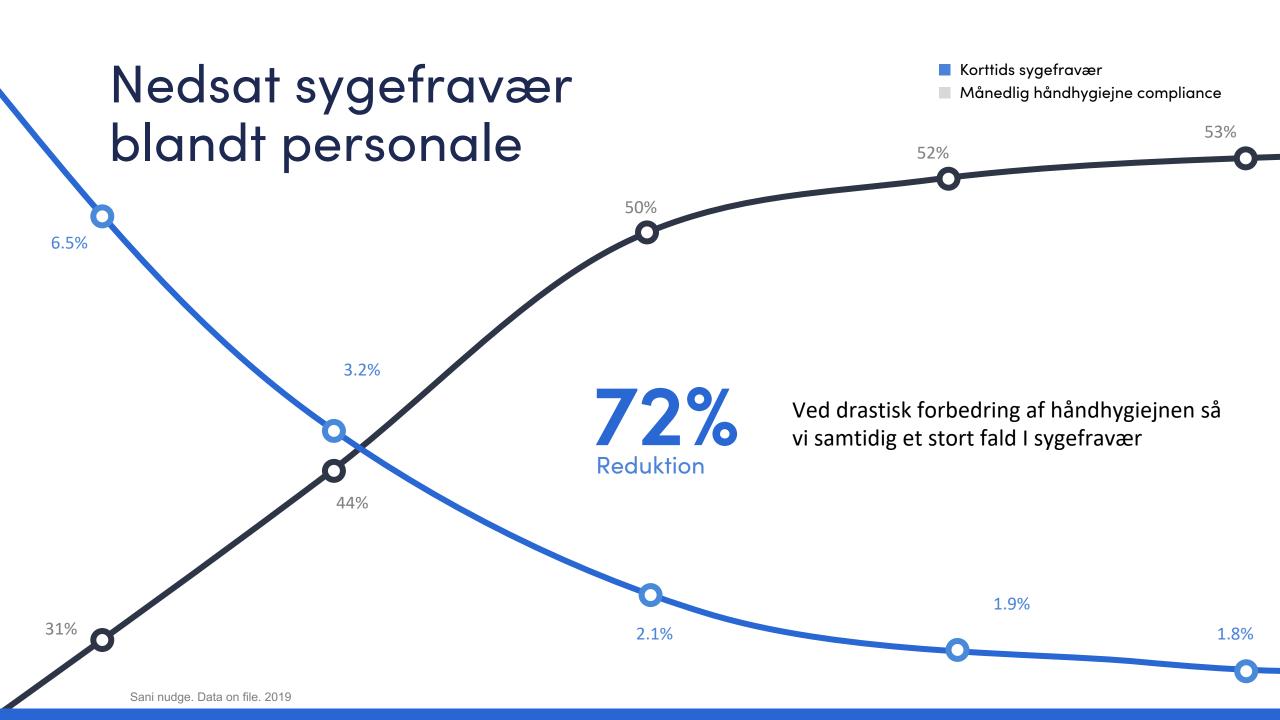












# Research pipeline

Vi har studier kørende på ledende forskningsinstitutioner

Collaborators	Project		ota Ilection	Data analysis	In review	Published	
Bispebjerg & Aarhus University Hospitals Jenny Dahl Knudsen, Svend Ellermann-Eriksen, Anne-Mette Iversen, Marie Stangerup et al.	Light-guided nudging and data- driven performance feedback improve hand hygiene compliance among nurses and doctors.	Published					
Bispebjerg & Aarhus University Hospitals Jenny Dahl Knudsen, Svend Ellermann-Eriksen, Anne-Mette Iversen, Marie Stangerup et al.	Significantly improved hand hygiene compliance using nudging and performance feedback	Published					
University Hospital Mannheim Alexandra Heninger, Nina Wismath, Evelyn Fritz, et al.	Accessing the clinical accuracy of hand hyglene monitoring systems: Is it time for new standards?	In Review					
Technical University of Denmark, Aarhus University Hospitals, & Sølund Nursing Home COVIDtrace project group	A data-driven modelling of disease transmission and pathways in healthcare workers.	Data Analysia					
Selund Nursing Home COVIDtrace project group	Improving hand hygiene in nursing homes.	Data Collection					
Bispebjerg & Frederiksberg Hospitals Marie Stangerup, Bente Olesen, Henrik Calum et al.	The effect of nudging in improving hand hygiene compliance	Data Collection					
Herning & Holstebro Hospitals Susanne Gundersborg, Annette Haagerup et al.	The effect of a single-patient rooms vs. multi-patient rooms on hospital staff's hand hygiene compliance	Data Collection					
Kolding Hospital Jens Kjølseth Møller, Susanne Kolle, Mette Holst, Annie Rosenfeldt Knudsen et al.	Automated hand hygiene monitoring and interventions to improve hand hygiene compliance	Data Collection					
Aarhus University Hospital Anne-Mette Iversen, Svend Ellermann-Eriksen, Morten Münster, Brian Kristensen et al.	The effect of performance feedback and behaviorally-informed messaging on hand hygiene compliance on healthcare workers	Date Collection					
Radboud University Medical Center Joost Hopmann, Heiman Wertheim, Amla Tostmann et al.	Improving hand hygiene compliance using automated monitoring systems and regular feedback to healthcare workers	Data Collection					
Imperial College NHS Trust Hospitals Jon Otter et al.	Implementing and using data actively to reduce the number of hospital-acquired infections and staff sick leave	Data Collection					

# Udvalgte kunder



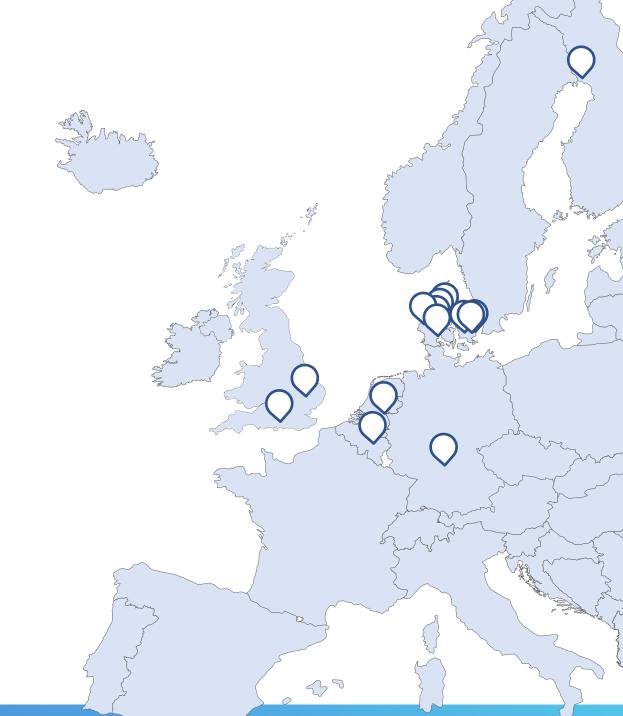
Tranbjerg plejehjem Danmark



Sølund plejehjem Danmark



Imperial Trust London England



# Kom igang for en lav månedlig pris

Pris eksempel for plejehjem med 100 boliger

Udstyr: 98.000,00 kr.

Implementering: 29.500,00 kr.

Månedlig licens: 11.500,00 kr.

Total år 1: 265.500,00 kr.

Total år 2: 138.000,00 kr.

## **Kontakt**

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+45 3113 7282

### **Q&A**

På døgn-/dagtilbud/værksteder for mennesker med udviklingshæmning er vi ret sikre på, at borgerne er lige så meget smittespredere som personalet - der er megen kropskontakt dagen lang. Vil du mene at vi vil kunne udrede også ift deres hygiejne - tror du de vil kunne bære sensoren uden at "pille den af sig"?

- Vores system er målrettet personale, men hvis borgerne på dagtilbud er motiveret til at arbejde med deres hygiejne, kan systemet sagtens bruges med dem.

Hvad vil det koste på et genoptræningcenter der betjener 2700 borger årligt fordelt på 2 afdelinger? Borgerne træner ambulant

- For at vi kan give et tilbud skal vi vide hvor mange steder I ønsker at implementere systemet.

Hvordan er levetiden for hardware? Både sensorer og batterilevetid.

- De holder batteri i 24 måneder på 4 stk AA batterier, som vi kender fra fjernbetjeninger. Sensorerne er der garanti på så længe der betales licens.

Var licens udgiften 11.500 /måned?

- Licensen afgøres af hvor mange steder i måler håndhygiejnen. For 100 boliger vil det blive 11.500 kr/måned.

Overvågning af borgere rejser mange etiske og juridiske spørgsmål.

- Det er korrekt og man kan også diskutere om det har den store effekt på infektionsspredning at forbedre håndhygiejnen blandt beboerne. Derfor fokuserer vores løsning på personalet, der er den største smittekilde.