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# „Experience with next generation hand disinfection monitoring approach in Germany (IoHT) ”

## Session

“Epidemiologically significant microorganisms - **preventive** and repressive anti-epidemic measures:  
disinfection & sterilization in healthcare facilities and hospital disinfection plans (directives and rules)“

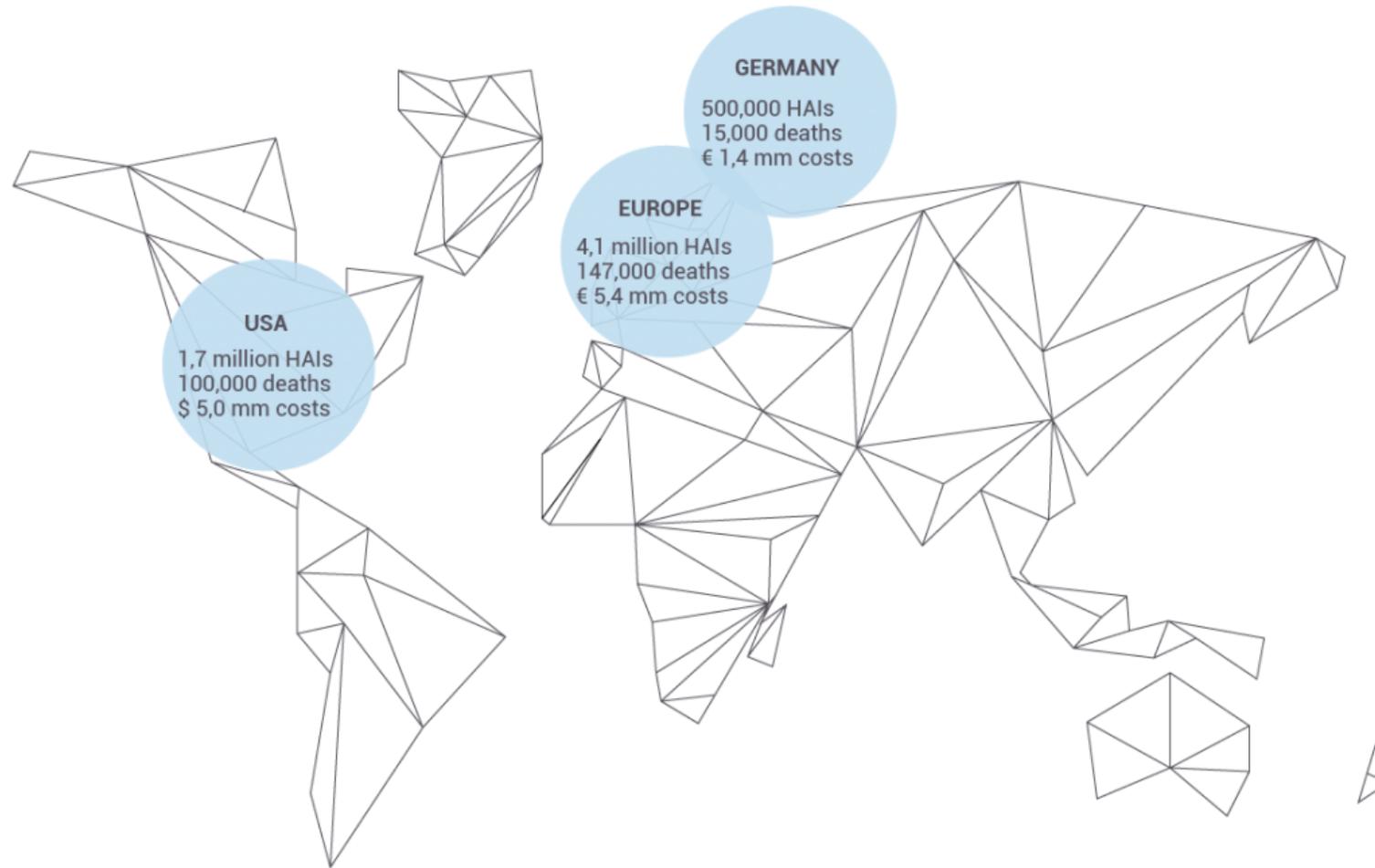
Dr. Ehsan Khaljani, FEBU, MBA

Surgeon/ Professor for Healthcare Management / Managing Director of HygNova

16.04.2019, Brno/ Czech Republic



# HYGIENE IS A GLOBAL CHALLENGE!



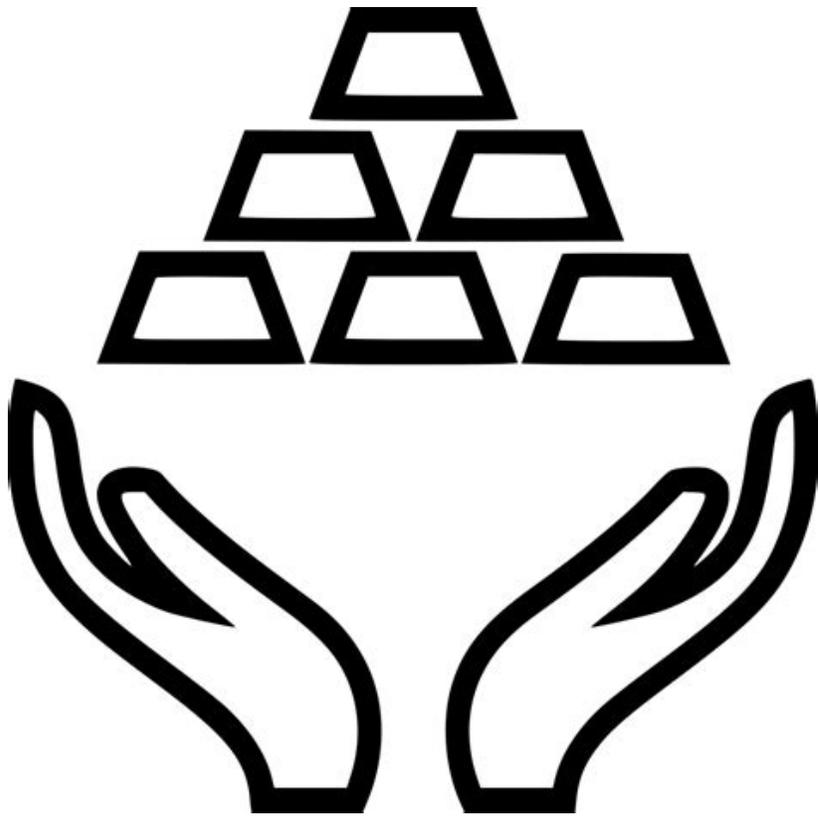
HAIs : Healthcare-associated infections

Source:  
Deutsche Gesellschaft für Krankenhaushygiene  
Analysis of position paper  
Popp et al., März 2016

Source:  
World Health Organisation  
WHO Guidelines on Hand Hygiene in Healthcare  
WHO, 2009

# GOLD STANDARD IN HAND HYGIENE MONITORING

## Direct observation by hygiene experts



### Challenges

- Observer Bias
- Not permanently
- No reproducible data
- No real-time data
- Costly

# STATE OF THE ART

## Wearable Devices To Monitor Hand Hygiene



Various technical approaches exist to measure hand hygiene.

All approaches are based on **wearable devices.**

# BIASES OF WEARABLES



## USER-BIAS

Staff doesn't use wearable devices as required!

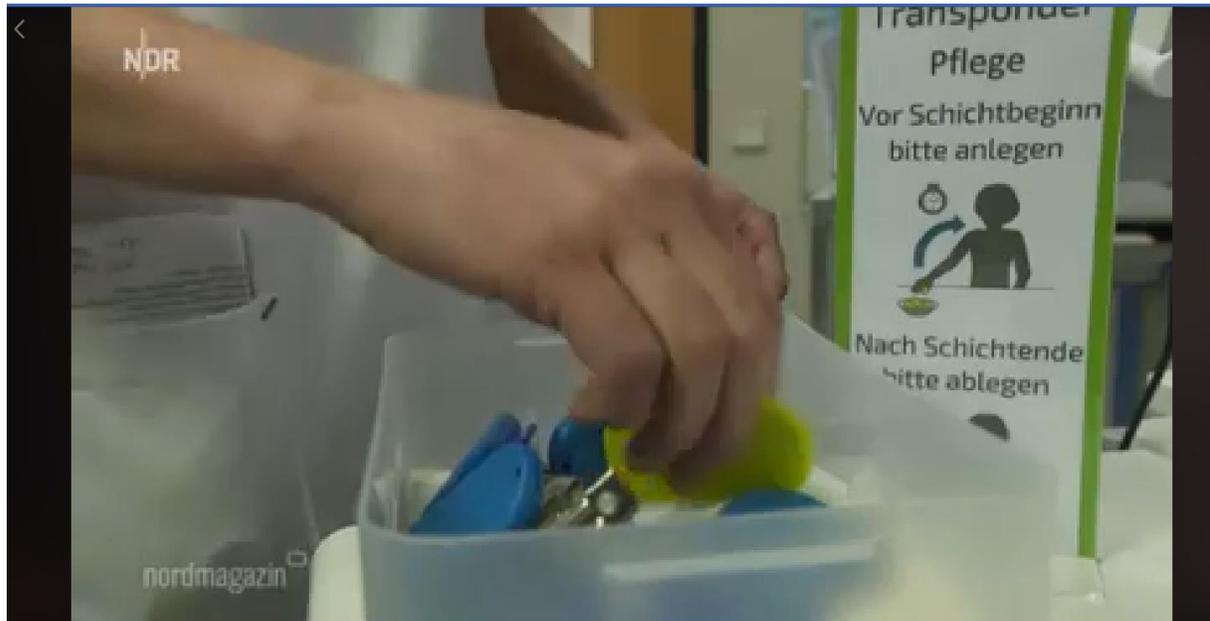
# USER-BIAS



Less than 40%  
of staff wears wearables.

- No valid data
- Personalization problems
- GDPR inconsistency

# BIASES OF WEARABLES



## Hygienic vulnerabilities

Transmission of antimicrobial resistant germs via wearables in charging points.

Source: NDR - nordmagazin

# NEXT GENERATION APPROACHES



Solutions without  
wearable devices

- Reproducible data
- GDPR conformity

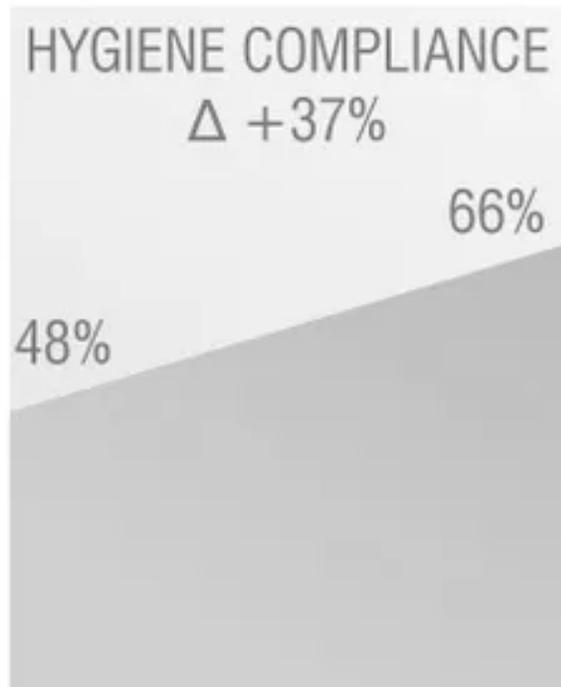
# NEXT GENERATION APPROACHES – OpHardt OHMS



New, smart dispensers

- Sending information via WIFI
- Data gathered in dashboards

# NEXT GENERATION APPROACHES – OpHardt OHMS

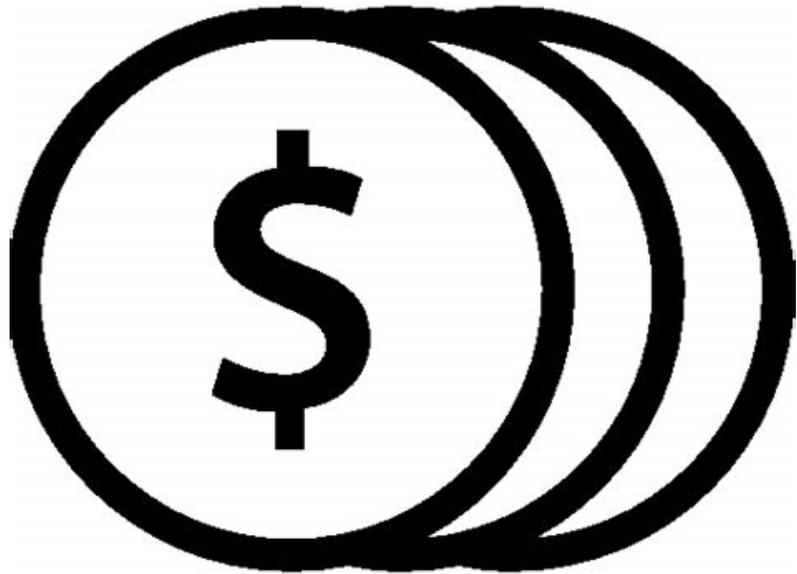


Value

- Increase in  
hand hygiene compliance

# CHALLENGES

## OpHardt OHMS

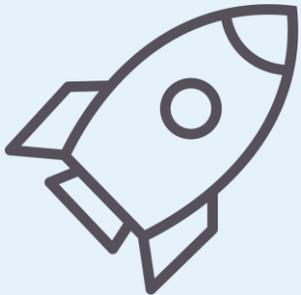


### Price

- Need for new dispensers (>200 € per dispenser)
- Installation costs

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# Requirements for next generation hygiene monitoring solutions



Increase in  
hand disinfection rate  
via Hawthorne effect



Anonymous data analysis  
in the 5 WHO moments  
for hand hygiene



No use of  
wearable devices due  
to lack in compliance



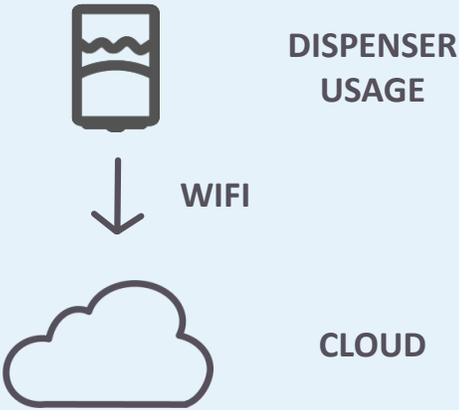
HYGNOVA ADVANCE  
IoT-MOTION DETECTION  
FOR HAND HYGIENE

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# HYGNOVA ADVANCE TECHNOLOGY

## Step 1

Upgrade of  
**existing dispensers**  
with smart chips



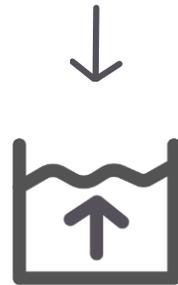
LOCALISATION



COUNT OF USAGE



FLUID USAGE PER TIME



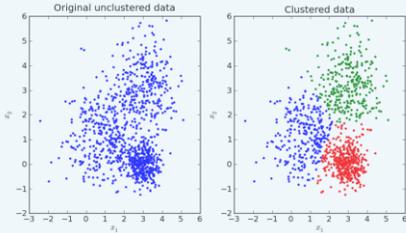
FILLING LEVEL

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# HYGNOVA ADVANCE TECHNOLOGY

## STEP 2

DATA ANALYSIS  
VIA  
ARTIFICIAL INTELLIGENCE



CLOUD



Moment for disinfection?



MOTION DETECTION SENSOR  
CHECKS MOVEMENTS IN THE ROOM

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# HYGNOVA ADVANCE TECHNOLOGY

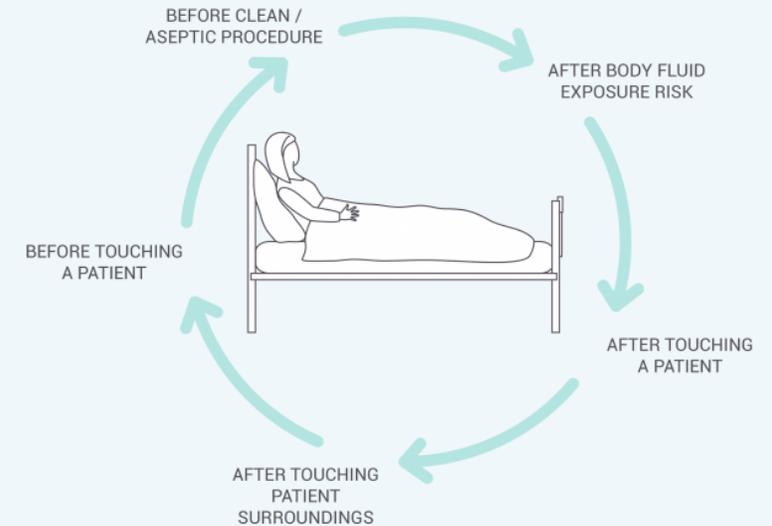
## Step 2

Data of > 60 surveillance studies  
i.e. Allegranzi et al.,  
Journal of Hospital Infections, 2013

Moment for disinfection?

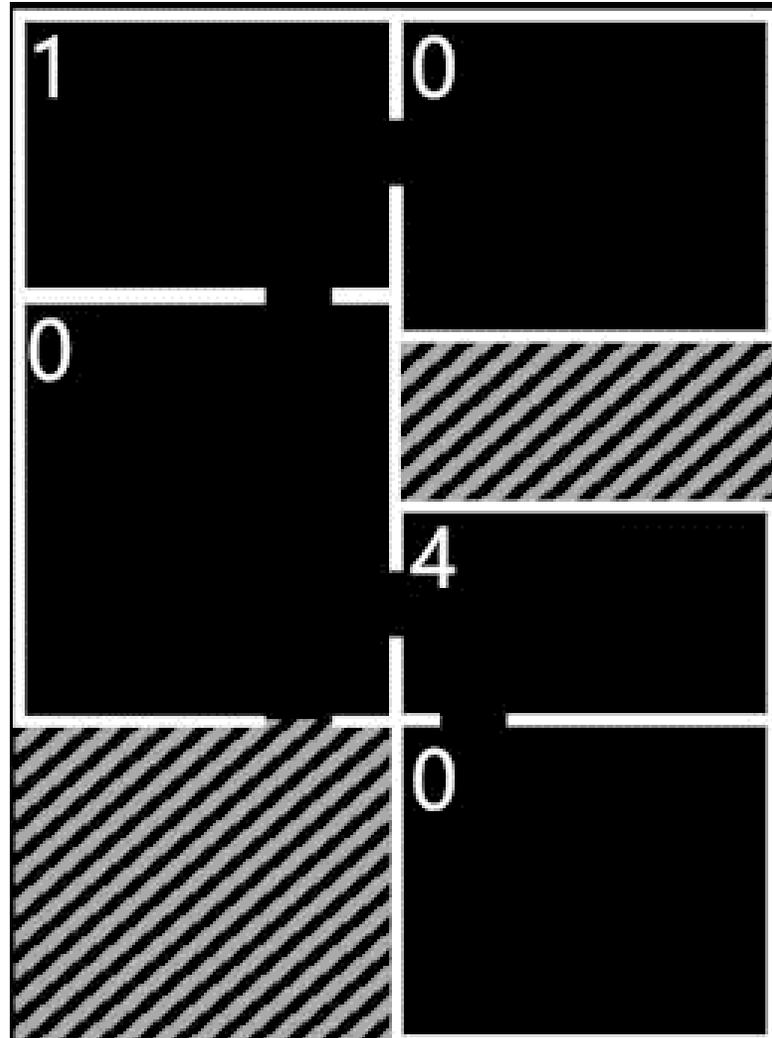


HygNova pattern recognition algorithm



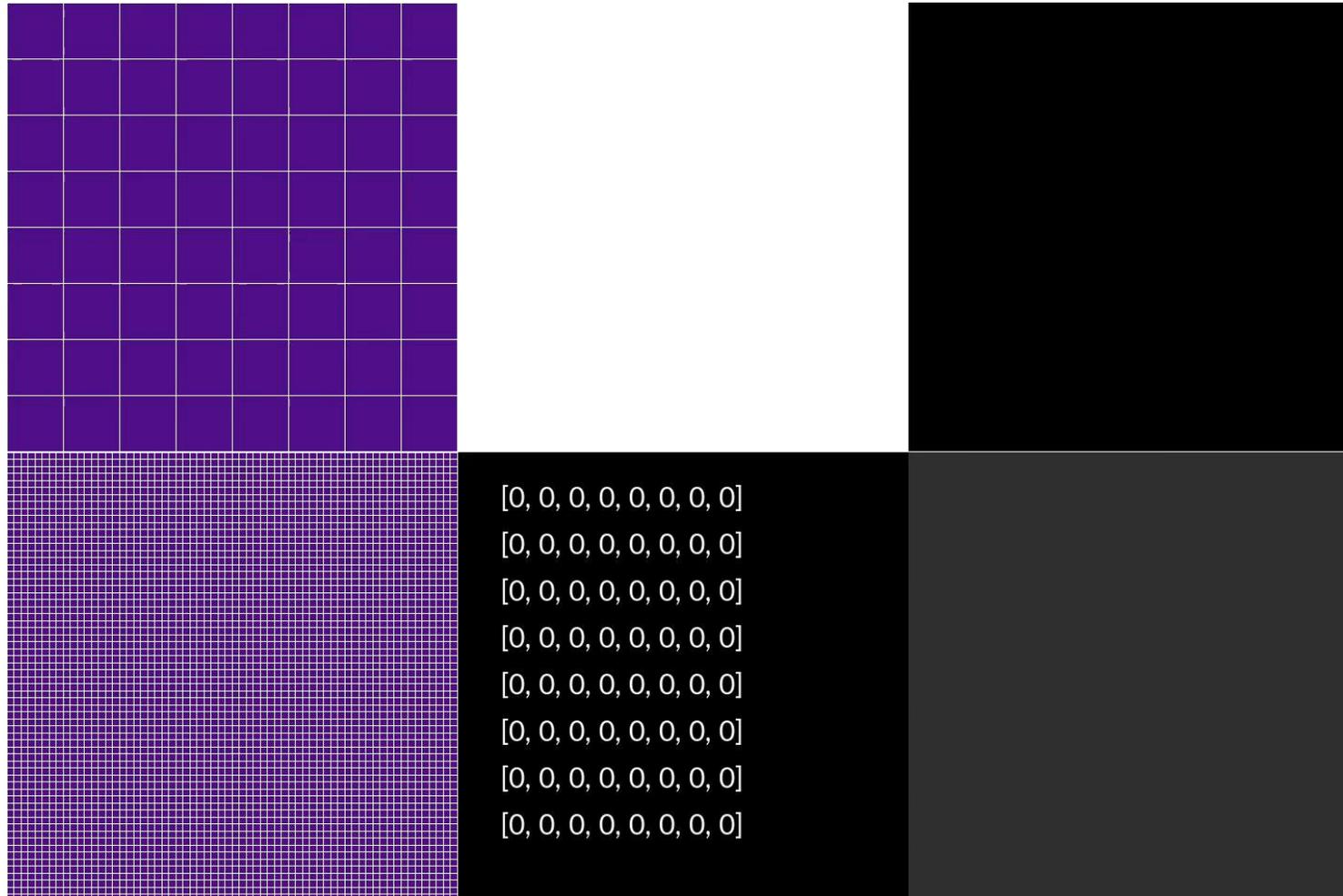
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# ANONYMOUS TRACKING OF MOVEMENT PATTERNS



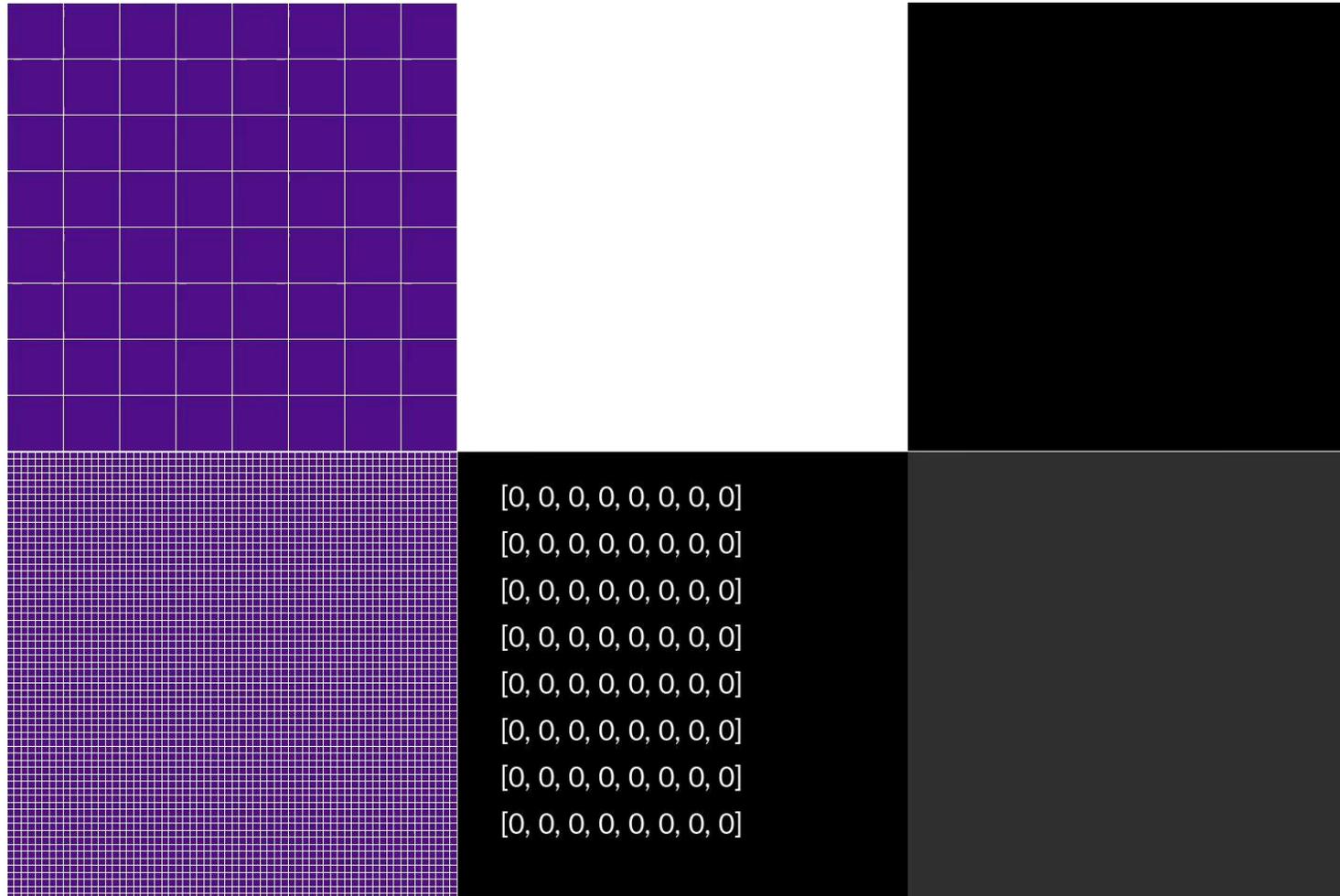
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# ANONYMOUS TRACKING OF MOVEMENT PATTERNS



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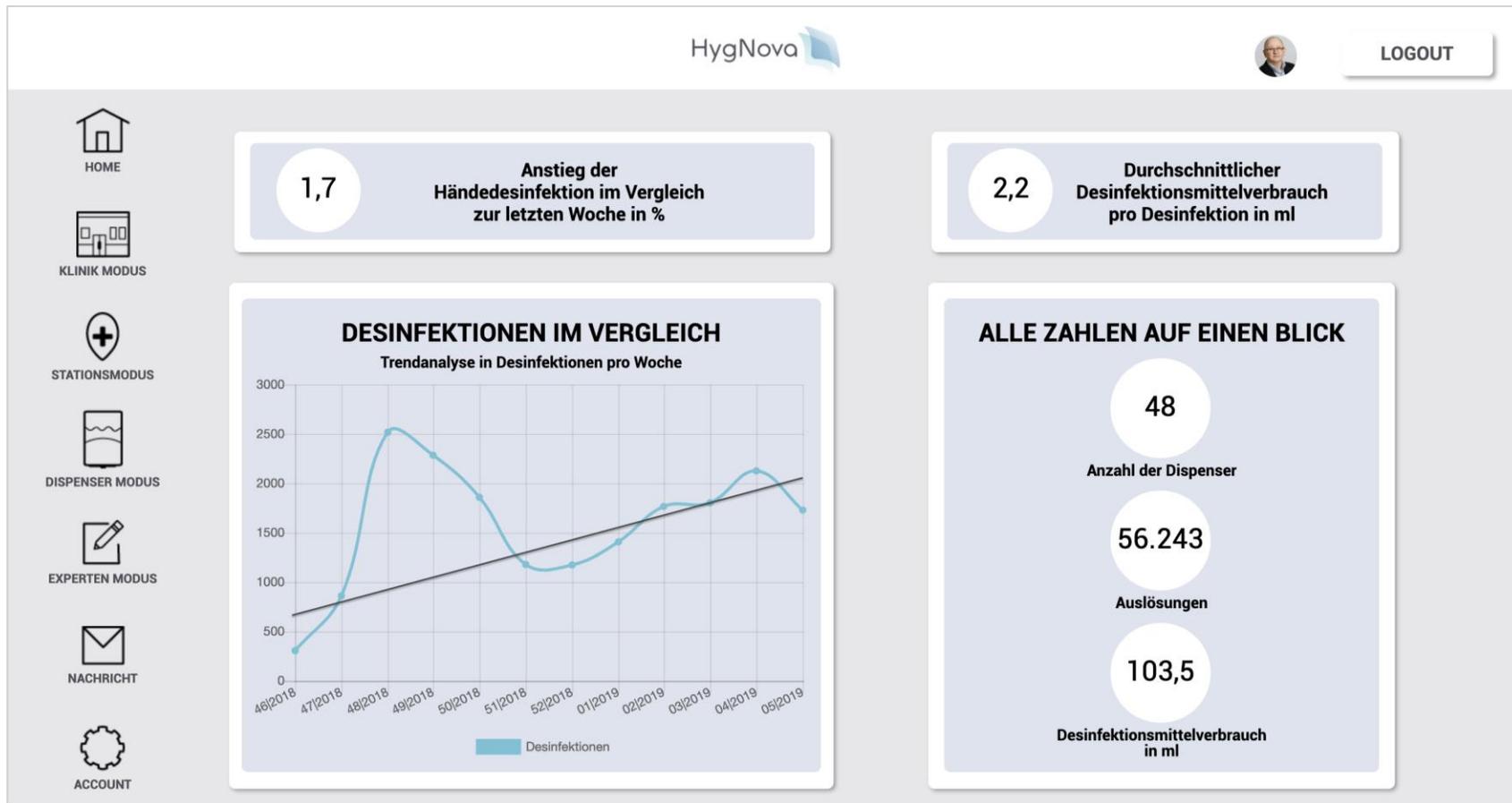
# ANONYMOUS TRACKING OF MOVEMENT PATTERNS



# VALUE

Increase of hand disinfections > 36% via Hawthorne effect  
(3 months of surveillance)

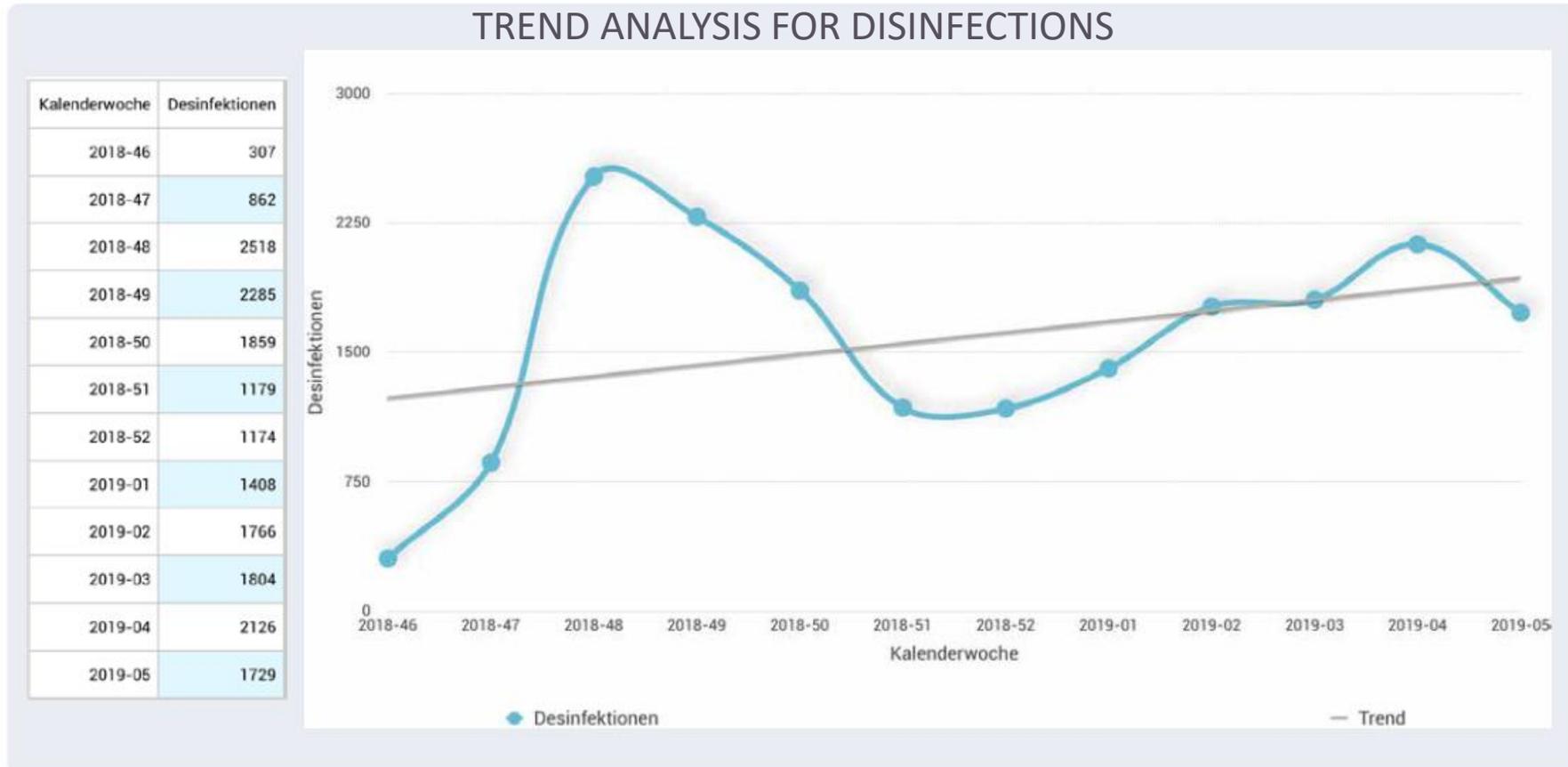
Hospital in Berlin/Brandenburg region | Source: HygNova GmbH



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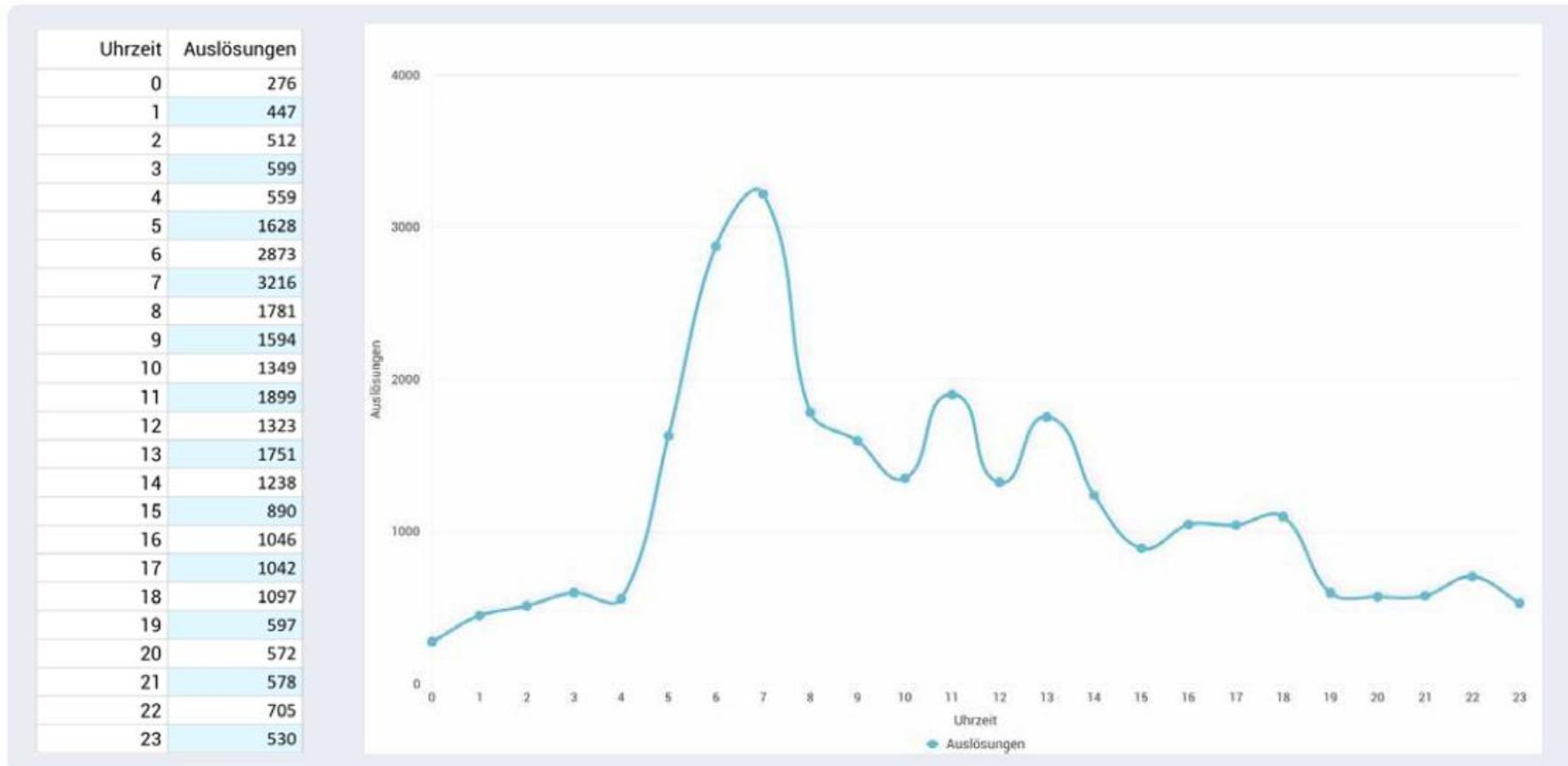


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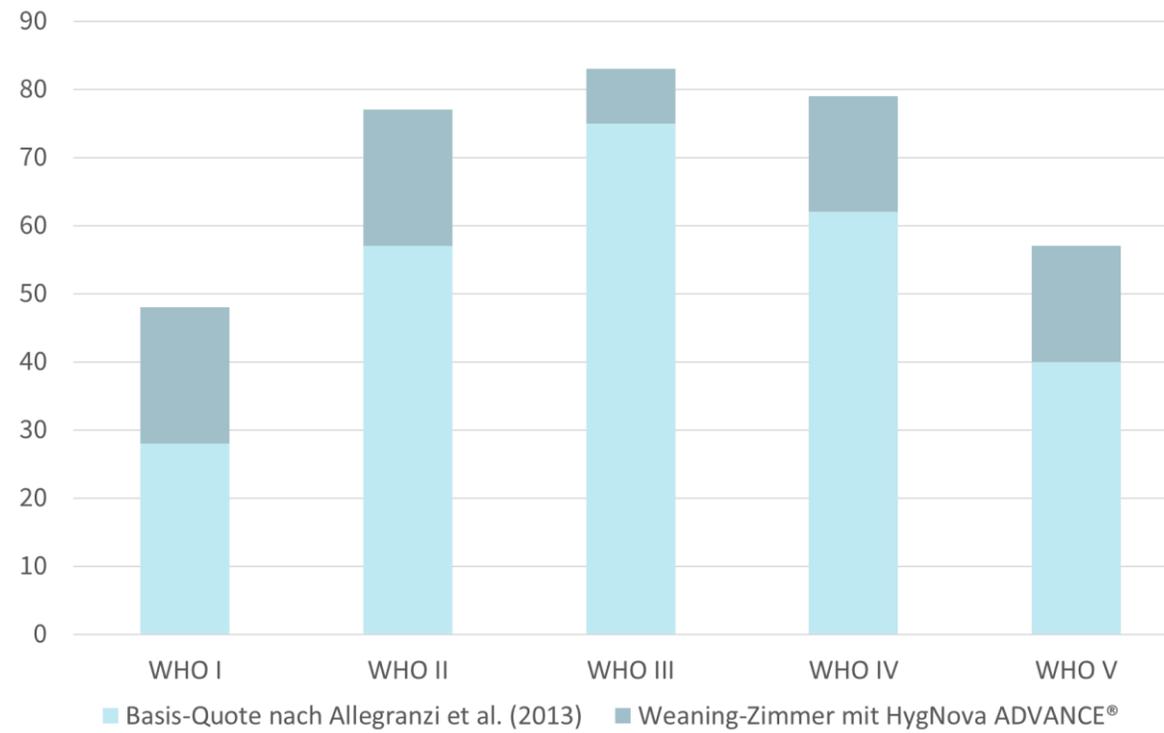
## TIME PATTERN FOR DISINFECTIONS



# VALUE

## Approximation of 5 WHO moments for hand hygiene (3 months of surveillance)

Hospital in Berlin/Brandenburg region | Source: HygNova GmbH

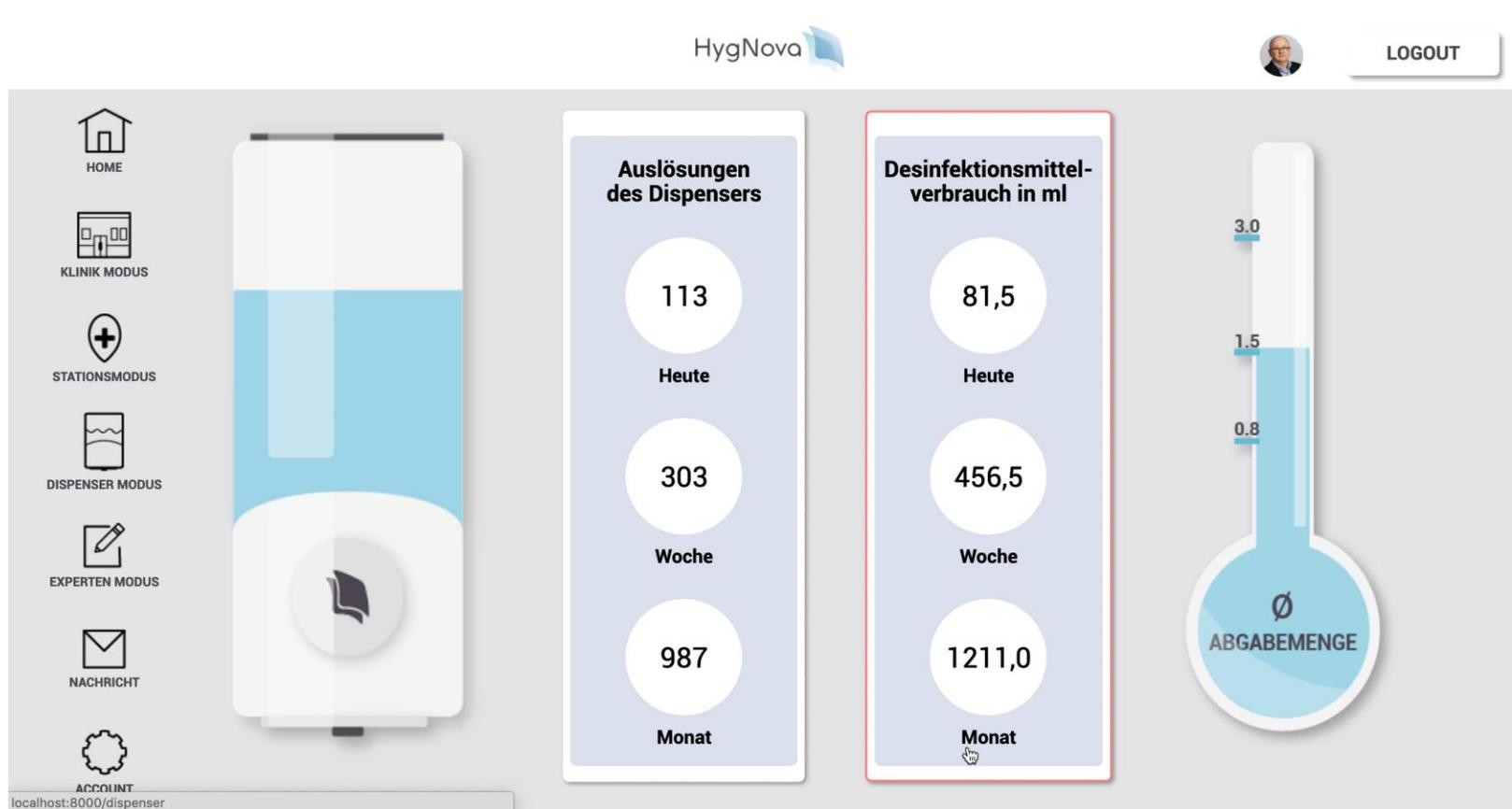


Approximation of 5 WHO moments in weaning clinic for 3 months

Berlin/Brandenburg, 2017, Source: HygNova

# VALUE

Live data in user friendly data dashboards  
Hospital in Berlin/Brandenburg region | Source: HygNova GmbH



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# VALUE



## Less hospital infections

An increase in hand disinfections about 18% leads to 41% less healthcare acquired infections

Source: PITTET et al, Lancet, 2000

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# BENEFITS IN DETAIL

## 1. DIRECT BENEFIT

Immediate improvement in  
hygienic behavior of staff



Instant savings  
by less hospital infections

## 2. LONG-TERM BENEFITS

Continuous improvement of processes  
with valid data



Sustainable savings  
due to lowered costs for personnel

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# EFFECTS



Ease-of-use  
Smart patients room in  
less than 2 minutes

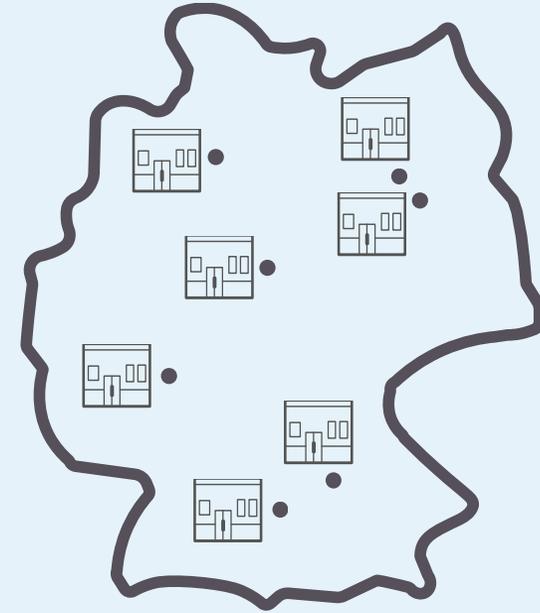
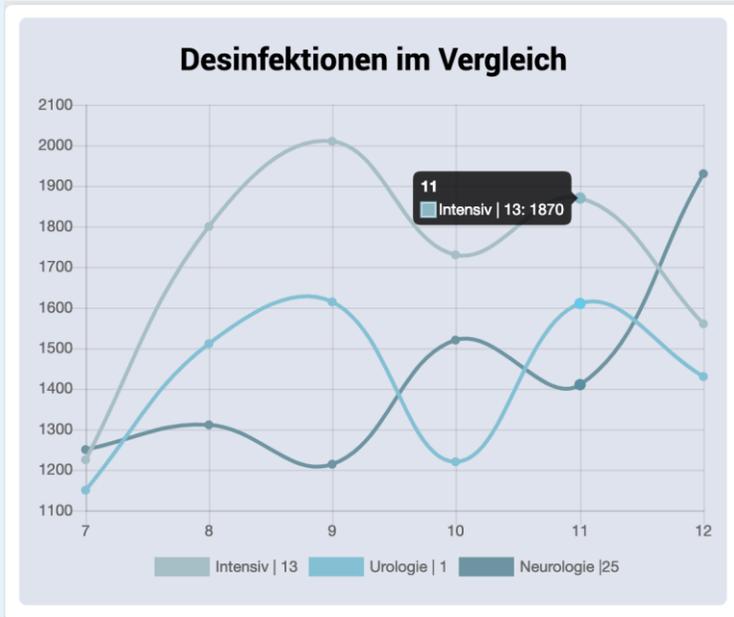


Cost-effective solution with  
high potential for relevant  
savings on the long-term



Amortization is reached  
after 1-2 months due to  
lowerd costs

# PENDING



LONG-TERM, MULTICENTRAL  
COST-EFFECTIVENESS ANALYSIS

Study protocol in development with University Hospital Heidelberg, Prof. Frank

# UPCOMING, RUNNING & COMPLETED INSTALLATIONS (SELECTION)



This project received funding by:



Gefördert durch:



aufgrund eines Beschlusses  
des Deutschen Bundestages



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## Quote

**“The time will come soon** when our colleagues and students place stringent demands on us and our actions, in which general comments about the success of this or that operation will be not enough anymore, but **keeps any doctor for a charlatan** who will be not able to **express his experiences in numbers**”  
in „Chirurgische Erfahrungen“ (Zürich 1860-1867)

**Theodor Billroth** (1829 –1894) the surgeon, who is generally regarded as the founding father of modern abdominal surgery.

