

HARTMANN



LOOKING BACK AND AHEAD

**Past and future challenges
in infection prevention**

HSC Symposium 2023

We don't need no automation



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We don't need no automation

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Conflict of interest

- No conflict
- My institution uses HAIDI[®] as a tool

Definition

Infection(s) acquired during the process of receiving health care that was/were not present during the time of admission

Consequences of HAI

- 37.000 patients die each year in Europe due to HAI
- Higher letality (Pneumonia 30%, Sepsis 50%)
- Prolonged stay in a hospital (10 days)
- Increase in primary and secondary costs, e.g. SSI up to €5000 additional costs (*Nachtigall et al. 2018*)
- Costs for antibiotics, surgical time, etc.
- Increase in insurance premiums and costs
- Loss of reputation for the hospital....„word is getting around“

Facts

- ECDC: nosocomial infections occur in 4.1 million patients annually in Europe
- Germany: additional costs of €200 million per year in hospitals
- Austria (*Metz et al., 2005*): €16-35 million additional costs
- Europe: 2-19 billion € costs for HAI
- Italy: 12 billion (!!) €/year are spent on legal cases related to HAI
- 13-23% of nosocomial infections are avoidable

HAI rates

- Swedish study with 1300 patients: 9-13%
- Europe-wide about 5-9%
- Ried, Europe PP: 4%
- RKI: The estimated number of nosocomial infections in Germany is about 400,000 to 600,000 per year, the number of deaths is between 10,000 and 20,000.
- One major problem is the surveillance methodology: most of IC-Teams (ICT) manually record data => data mining ala => So let us look ahead into 2023



What we did so far

- Vinzenz Gruppe implemented own HAI-reporting System
- Manually...
- KISS-Reporting System (Charité Berlin)
- EPPS (Europ. Point Prev. Study)

- So far, manual surveillance of HAI ist resource intensive und mostly lacks standardization among different health care institutions
- HAIs are more and more included in reporting systems, Homepages, even benchmarking and also payment issues

I have a dream...eierlegende Wollmilchsau

- A system that scans all digital data and filters out suspected HAI cases
- Little effort for the Infection control team (ICT)
- No tedious typing of data into lists and forms
- Inclusion of HIS data and e-fever curve (in our hospital MEONA)
- Scanning free texts, not just figures and structured data
- Daily update of all patients => observe developments, trends
- Setting hygienic measures in a targeted manner => targeted bundle strategy instead of „the watering can principle“ for the aim to eliminate potential deficits
- Finding clusters or outbreak-situations and follow up (line lists)
- Interface to reporting programmes like KISS
- Finally: this „magic pig“ should be easy to implement and should be cost-efficient

Literature and premises

- The need of systematic surveillance concerning HAI is undoubted => due to the implication on morbidity, mortality and costs
- Digitalization may be helpful in finding more HAIs
- **Advantage may come at the price of decreased clinical relevance and limitations in preventive issues**
- Workload for infection control teams is reduced but a high level of datasecurity issues are needed to be considered
- A high level of digitalization in a hospital (records, results...) is obligatory and a major requirement

So we found a way



- We found a software solution from a czech IT-Company (Datlowe) named HAIDI®
- This solution automates parts of surveillance of HAI by analysis of patient medical records
- HAIDI®
 - automatically analyses structured and unstructured data from the medical documentation and any related information from the Hospital Information Systems (HIS)
 - extracts information which might be relevant for detection of a potential HAI and encodes them
 - creates structured information from unstructured texts
- The output of this analysis is a timeline of events used as a basis for identifying the occurrence of HAI



- Using SNOMED allows to be language agnostic from the point when the information is encoded in SNOMED concepts. Fever (EN), Fieber (DE), horečka (CS) have the same concept assigned
- The system distinguishes between negative and positive words and phrases ("negates cough " vs. "coughs", "no dysuria" vs. "burning on urination", etc.)
- The system has its own methods of correcting typing errors
- Able to filter out historical information ("12/2019 bronchopneumonia", etc.)

Screened documents



- admission reports and discharge reports
- daily decursions
- operation protocols
- medication lists, including antibiotic therapy
- laboratory results including microbiological and virological laboratories
- nursing documentation
- conciliar examination
- results of imaging techniques

What the algorithm does



- Automatic identification of potential HAIs is based on standard European Centre for Disease Prevention and Control (ECDC) and Krankenhaus-Infektions-Surveillance-System (KISS) definitions of HAIs
- HAI identification works for all departments of hospital facilities
- HAIDI also looks for potential HAIs that do not fit the above definitions exactly. It therefore also works with approximate definitions based on clinical practice and experience
- Identification of infections takes place both **during hospitalization** and **during possible rehospitalization** or treatment in the **out-patient-setting** (e.g., an infection at the surgical site that becomes apparent during the ambulance check-up and does not require rehospitalization)

Which HAIs are detected



- urinary tract infections (microbiologically confirmed, microbiologically unconfirmed)
- primary and secondary bloodstream infections
- venous catheter-related infections
- gastrointestinal tract infections
- pneumonia, lower respiratory tract infections other than pneumonia and upper respiratory tract infections
- surgical site infections
- others

Output



- HAI type
- Department of origin
- Estimated date of HAI
- state of the report
- reason for reporting (link to key information from timeline)
- HAI origin - endogenous, exogenous, unknown
- When the same HAI is found repeatedly, it is merged with the original report and thus does not appear as a new HAI in the interface
- Antimicrobial resistance data

What HAIDI does not..



- Clustering and outbreak-management is not implemented yet and is worked on
- KISS-interface with automated upload of data into the KISS-System not yet implemented and is worked on
- Some „teething problems“ are being solved just in time
- **Does not make a decision – we as ICT have to decide if a suspected HAI is one or not**

„Teething problems“ before implementation

- Everything depends on the allocation of medical data in a digital way
- Intense communication between Datlowe and our IT-department
- Kind of lack of clarity due to „Austrian“ way to write reports (different doctors have different styles....)
- Some special wording in Austria

These items were solved immediately

Benefit so far

- 10 month of daily informations about potential HAIs
- 30-45 minutes of focussing on HAIDI per day for the IC-Nurse
- Daily „real time“ HAI rate on the screen
- „Watch-and-wait“- situation in some cases, where HAI ist pending
- Detection of „hot spots“ and thus oppurtunity to intervene
- Statistical analysis of all aspects with „a push of a button“

Data in Ried

- Data manually found by our IC-Team and data found by HAIDI matched by 100%
- Provided data quality still needs some improvement:
 - Inclusion of MEONA (e-curve)
 - The amount of records uploaded

TECH TRANSFORMERS

Stephen Hawking says A.I. could be 'worst event in the history of our civilization'

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KEY POINTS

- Physicist Stephen Hawking said the emergence of artificial intelligence could be the "worst event in the history of our civilization."
- He urged creators of AI to "employ best practice and effective management."
- Hawking is among a number of voices including Elon Musk who have warned about the dangers of AI.

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Conclusion

- Everybody talks about „artificial intelligence“ and how it will influence health care in the time being
- Everybody fears artificial intelligence, because we do not foresee how it will really influence our life
- Nowadays threats predominate benefits (in the public discussion)
- So let us start with „AI-light“, with algorithms, that help us to reduce our daily workload on „searching, screening, going through records“
- Let us implement applications, that gather data **that in the end we have to sort out, interpret and take the responsibility for**
- So we do not let the machine win....;-) and: We do need AUTOMATION

Thank you for
your attention

