ECCMID highlights 2024

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Risk communication: lessons learnt and best practices for the next pandemic

This symposium addressed the experience of risk communication in a pandemic and opportunities to learn and build for other infectious disease emergencies. The pandemic led to a sudden focus on ID experts, who were called upon to fill a wide number of public-facing communication roles often under intense pressure, and with little prior experience or exposure. At the same time social media came to embody a new and distinct dynamic in risk communication, one characterized by the phenomenon and logic of contagion, as noted by the term 'going viral'. This session was an opportunity to share and learn from experiences both positive and negative, asking what worked, what didn't and to help understand why. Two of the 4 presentations are summarised here.

Helen BRANSWELL from the United States is a senior writer at STAT - Reporting from the frontiers of health and medicine (statnews.com) covering infectious diseases and global health; she has written about 2003 SARS outbreak, bird flu, the H1N1 flu pandemic, Ebola, Zika, polio, mpox, and led STAT's coverage of the Covid-19 pandemic. She discussed the communication around COVID vaccines, stressing the importance of mentioning what vaccines can do and what they cannot do. If vaccines transform a potential life-threatening pneumonia to a common cold, it is a success. The world was told in December 2020 that the vaccines efficacy was around 95 %, thus all expectations of transmission-blocking were piled up on these vaccines. But we got vaccines that were unable to block infection/transmission. However, they saved lives and changed the trajectory of the pandemic. Why was the flu model ignored? Flu vaccine should have been a cautionary tale about how much to expect from a vaccine against a respiratory virus. Experience with flu vaccine should have raised questions about the durability of the immune response triggered by such a vaccine, the possible need for annual top ups. It should also have raised concern about the possibility the vaccine would need to be updates annually. Indeed, the pubic accept that flu shots must be taken annually because protection from vaccination is not durable, must be updated annually because the virus evolves, do not offer a complete protection against infection, but reduce the risk of severe illness and death. The American CDC campaign Wild to Mild | CDC was shown as example. Why is it ok for flu and not for COVID? The take home messages were that in general, the public does not understand the iterative nature of science. It's crucial in outbreaks to explain that it will take time to get some answers and to prepare the public to expect change, both in guidance and in policy. She ended her presentation with a quote from B. Graham, one of the designers of the COVID vaccines: "It's not a magic wand… It just gives you a little bit better chance of surviving".

Siouxsie WILES is associate professor at University of Auckland, New Zealand (Siouxsie Wiles Profile | University of Auckland). She and her lab are searching for new antibiotics as well as trying to understand how bacteria evolve to become more infectious. She also has a keen interest in demystifying science. She is an avid tweeter and has worked with artists and illustrators. When the pandemic arrived, she joined forces with Spinoff cartoonist Toby Morris to make the science of the pandemic clear and understandable. Their award-winning graphics have been translated into multiple languages and adapted by governments and organisations around the world.

For her research doesn't end with a peer-reviewed publication, communicating science in different ways to a wide audience is just as important. The article "Going viral: A science communication collaboration in the era of COVID-19 and social media" published in frontiers in 2023 summarized her approach (https://doi.org/10.3389/fcomm.2023.1087120). On 9 March 2020, 2 days before the WHO declared COVID-19 a global pandemic, an animated GIF (Graphics Interchange Format) known as "Flatten the Curve" went viral on Twitter with over 10 million impressions in 3 days. Flatten the Curve was the first of more than 70 graphics produced by S.Wiles and the cartoonist T. Morris, all designed as accessible visual communication about COVID-19. The graphics have been translated into multiple languages, used by communities, politicians, and public health officials around the world, and the collaborators have won multiple awards for their work.

She also highlighted that working with trusted voices was essential for transmitting messages. Finally, she spoke about the backlash, pointed out that many scientists received personal insults, attacks on their capabilities, allegation of dishonesty or corruption, etc. because of the contributions they make to the public debate, and mentioned the Dutch initiative Safe Science (https://www.wetenschapveilig.nl/en/about-us), a resource helping scientists to find the right support in the event of threats, intimidation or hate speech.

Semiautomated surveillance of deep surgical site infections: algorithms for colon surgery, vascular surgery and orthopaedics

Jannie Romme et al. Infection Control, Amphia Hospital, the Netherlands (Poster 3198)

In this Dutch study, the authors investigated whether semi-automated surveillance of deep and organ/space surgical site infections has sufficient sensitivity and specificity with regard to the diagnosis of surgical site infections compared to manual surveillance.

The elegance of this study was the simplicity of the algorithm, which could easily be adopted by another system: For example, for colon surgical site infections, they checked to see if the patient met at least one of the following criteria: Deceased, re-hospitalisation, re-operation or interventional radiological puncture or drainage of an abscess (all within 30 days). If at least one of these criteria was met, a suspected surgical site infection was diagnosed and the comparison with the fully manual surveillance was carried out. In the two years study period with around 1100 colon surgeries, a sensitivity of around 94% and a specificity of around 81% were achieved with an overall infection rate of around 6%. In vascular surgery and orthopaedics, the sensitivity (with slightly different criteria) was even 100% and the specificity between 72-96%.

If a restriction to the suspected surgical site infection cases from the semi-automated observation would have been done, the workload could theoretically have been reduced by around 75%. Overall, this appears to be a very valid approach, as semi-automated surveillance allows the relevant cases to be pre-selected sensibly and the manual effort can then be greatly reduced. The loss on the sensitivity side can be considered small in comparison to the resulting savings in workload. The specificity of at least 72% shows that manual surveillance continues to play an important role here. The time gained can then be invested in improving and implementing infection control processes.

In summary, this study shows that the inclusion of semi-automated mechanisms in SSI surveillance is in principle a valid approach.

A randomised controlled trial investigating the effect of improving the cleaning and disinfection of shared medical equipment on healthcare-associated infections: the Cleaning and Enhanced disinfection (CLEEN) study

Brad Mitchell, Katrina Browne, Nicole White, Philip Russo, Allen Cheng, Andrew Stewardson, Giorgia Matterson, Peta Tehan, Maham Amin, Maria Northcote, Martin Kiernan, Jennie King, David Brain

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There is emerging evidence around the role of the environment in the prevention of healthcare-associated infections (HAI) and a number of randomized controlled trials have already been conducted in this field with focus on antimicrobial surfaces, enhanced cleaning of patient rooms, terminal room disinfection, and bleach wipes. This study focuses on shared medical equipment with HAI as the main outcome. It is known that shared medical equipment has been implicated in transmission and subsequent infections in intensive care units using whole genome sequencing. The design was a step-wise randomized controlled trial in a hospital in Australia with the primary outcome of the proportion of adult inpatients with any HAI with a subgroup analysis with a combination of surgical site infections, bloodstream infections, urinary tract infections and pneumonia as well as all HAI excluding COVID-19 and all HAI excluding ear, nose, and throat infections. As secondary outcomes, the thoroughness of cleaning by using florescent markers and UV light as well as the cost-effectiveness, the cleaning time and interviews of the cleaning staff were assessed. The intervention comprised three extra hours of dedicated cleaning of shared medical equipment per weekday using detergent and disinfectant wipes. Dedicated staff received training for this and auditing of the thoroughness of cleaning with feedback to the staff was provided fortnightly. The intervention was compared to standard of care. Data collection was single-blinded by point prevalence study using the ECDC PPS protocol for infection definitions. Overall, 5'005 patients were included in the study, 2'497 (49.9%) in the control group and 2'508 (50.1%) in the intervention group. In the unadjusted results, there were 433 HAI in the control group (17.3%, 95%CI 15.9-18.8) and 301 HAI in the intervention group (12.0%, 95%CI 10.7-13.3). In the adjusted analysis, there were 14.9% (95%CI 10.4-19.4) HAI in the control group and 9.8% (95%CI 6.1-14.1) HAI in the intervention group resulting in an absolute difference of -5.2 (-8.2 to -2.3) and a relative difference of -34.5 (-50.3 to -17.5). The results were similar in the subgroup analysis. The proportion of cleaned shared medical equipment went up from 24.3% (95%CI 15.7 to 33.2) in the control group to 65.6% (95%CI 51.6 to 77.1) with an OR of 5.94 (4.13 to 8.55, p<0.001) 0 weeks after intervention exposure. Other possible confounders, such as policy changes, outbreaks, colonisation pressure, hand hygiene compliance, remained unchanged during the study period. This study reaffirms the importance of a hygienically clean clinical environment for patient safety and shows that enhanced cleaning and disinfection of shared medical equipment can reduce the incidence of HAI. Limitations are that multiple-use items were not necessarily clean in between every patient, but at least once per day as a minimum standard, and the single centre study design as well as the high baseline rate of infections. Analysis regarding the cost effectiveness and the cost-benefit analysis are currently pending.

Comment from Swissnoso: This study underlines that by enforcing basic infection prevention and control measures, such as cleaning and disinfection of shared medical equipment, a significant contribution to the reduction in HAI can be made.

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Study protocol:
Browne, K., White, N., Tehan, P. et al. A randomised controlled trial investigating the effect of improving the cleaning and disinfection of shared medical equipment on healthcare-associated infections: the CLEaning and Enhanced disiNfection (CLEEN) study. Trials 24, 133 (2023). https://doi.org/10.1186/s13063-023-07144-z

Statistical analysis plan:
Nicole White, Allen Cheng, Katrina Browne, Philip Russo, Andrew Stewardson, Maham Amin, Kirsty Graham, Jennie King, Peta Tehan, David Brain, Maria Northcote, Brett Mitchell. A randomised control trial investigating the effect of improving the cleaning of shared medical equipment on healthcare-associated infections (The CLEEN study): Statistical Analysis Plan. medRxiv 2023.12.20.23300169; doi: https://doi.org/10.1101/2023.12.20.23300169

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Year in Infection Control – Prof. Stephan Harbarth

Prevention of nosocomial pneumonia

Hospital-acquired pneumonia (HAP) has a large burden of disease with the highest number of disability-adjusted life-years among the six major healthcare-associated infections. Only few data exist on intervention strategies for the prevention of non-ventilator-associated pneumonia (nvHAP). This study (Wolfensberger A et al., Lancet Infect Dis 2023; 23: 836-46) evaluated the effect of a nvHAP bundle with five preventive measures: oral care, dysphagia screening and management, mobilization, discontinuation of non-indicated proton-pump inhibitors, and respiratory therapy in medical and surgical patients at the University Hospital in Zurich. A decrease in the nvHAP incidence density from 1.42 nvHAP/1000 patient-days (95%CI 1.27-1.58) to 0.90 nvHAP/1000 patient-days (95%CI 0.73-1.10) with an adjusted rate ratio of 0.69 (95%CI 0.52-0.91, p = 0.008) could be shown. Even a slight trend towards decreased mortality was shown (adjusted rate ratio 0.92, 95%CI 0.81-1.04, p =0.18). The biggest effect was seen on bedside dysphagia screening and management and the discontinuation of non-indicated proton-pump inhibitors. In addition, a higher implementation success score correlated with a lower nvHAP incidence. However, this study was monocentric and non-randomized, interfered with the COVID-19 pandemic, and the different bundle measures might have had a different impact on the results. Implications of this study are that nvHAP should become a prime target for HAI prevention, with dysphagia screening, withdrawing of proton-pump inhibitors and oral care as part of the standard of care. The importance of oral care is supported by a recent systematic review and meta-analysis by Ehrenzeller S et al (JAMA Intern Med 2024; 184:131-142) showing a risk ratio of 0.68 (95%CI 0.57-0.82) for HAP in mostly ventilated patients and a shortening of ventilator days (-1.2 days, 95%CI -2.4 to -0.1), ICU length of stay (-1.8 days, 95%CI -2.9 to -0.7), and lower risk ratio in ICU mortality (0.81, 95%CI 0.69-0.95).

In the prevention of ventilator-associated pneumonia (VAP), the study by Ehrmann S et al. (N Engl J Med 2023; 389:2052-2062) showed the effect of a 3-day course of inhaled amikacin initiated after the third day of invasive mechanical ventilation on the incidence of VAP with a reduction of VAP to 15% in the intervention group compared to 22% in the control group with very few serious adverse effects. However, the study was not powered to investigate death or length of stay in the ICU and hospital. The effect needs to be discussed in light of the high rate of VAP in the control group as well as potential inhibitory effects of amikacin on bacterial growth in clinical cultures and possible diagnostic bias. In addition, other infection prevention and control measures might be easier to implement. For example, the recently published multi-center clinical trial by Dahyot-Fizelier C et al. (Lancet Resp Med 2024) showed a reduction in VAP after a single IV dose of ceftriaxone.

Prevention auf surgical site infection

Perioperative antibiotic prophylaxis is essential for the prevention of surgical site infections. However, the choice of cephalosporins as prophylaxis is questioned in the case of high prevalence of methicillin-resistant S. epidermidis (MRSE) in clean surgery, such as arthroplasties. The placebo-controlled clinical trial by Peel TN et al. (N Engl J Med 2023; 389:1488-98) evaluated the efficacy of adding vancomycin to the standard antibiotic prophylaxis with cefazolin. Surprisingly, the SSI rate after 90 days was lower in the cefazolin & placebo arm than in the cefazolin & vancomycin arm (3.5% vs. 4.5% in knee, hip, or shoulder arthroplasty (relative risk 1.28, 95%CI 0.94-1.73, p = 0.11), and 3.7% vs. 5.7% in knee arthroplasty only (relative risk 1.52 (95%CI 1.04-2.23), respectively). This effect was more pronounced in patients preoperatively screened positive for methicillin-susceptible S. aureus (MSSA). Regarding adverse events, hypersensitivity reactions were more common in the Vancomycin group; however, acute kidney injuries were less common. Limitations of the study are that the prevalence for MRSA and MRSE was low, and most observed SSI were superficial. In conclusion, in low MRSA prevalence settings, there is currently no need for a double antibiotic prophylaxis in clean orthopedic surgery.

There are conflicting results with respect to the use of alcohol-based solutions containing iodine or chlorhexidine gluconate as skin antisepsis. In the cluster-randomized crossover trial by the PREP-IT investigators (N Engl J Med 2024; 390:409-20), iodine vs chlorhexidine gluconate as choice of skin antisepsis before surgical fixation of extremity fractures was evaluated, showing a lower SSI rate in closed fractures in the iodine group (risk difference -0.8 percentage points, 95%CI -1.6 to 0.0) and a trend towards lower SSI rate in open fractures (risk difference -0.9 percentage points, 95%CI -3.4 to 1.5). Skin antisepsis with iodine povacrylex in alcohol might be a good option if only one cycle of skin antisepsis can be applied; however, it does not prove yet that iodine-based solutions are superior in general for preoperative skin antisepsis (considering also the results of a large clinical trial from Switzerland, soon to be published in a leading medical journal).

Universal decolonization

In a cluster-randomized, multicenter trial with nursing home residents (Miller LG et al., NEJM 2023; 389:1766-1777), universal decolonization compared to routine bathing to prevent infection-associated hospitalizations showed a risk difference of 16.6% (95%CI 11.0-21.8, p < 0.001) and 14.6% (95%CI 9.7-19.2) in hospitalization for any reason, respectively. This translates into a number

needed to treat of 6.8 for infection-related hospitalization and 5.8 for hospitalization for any reason. The decolonization strategy consisted of nasal 10% povidone-iodine and 4% chlorhexidine wash for showering, and 2% no-rinse cloths for bed bathing. However, the intervention was difficult to implement in the nursing homes. In addition, the rates of multidrug-resistant microorganisms (MDRO) carriage was assessed, showing a reduction in overall MDRO carriage as well as carriage of MRSA, VRE, and ESBL. In the study setting, there was an overall high rate of MDRO carriage and also a high frequency of hospitalizations due to infectious syndromes. In addition, only the overall hospitalization due to infection was assessed which might not all be bacterial infections, but also viral. A training effect on general infection prevention and control quality could explain the difference. These factors need to be taken into account when applying universal decolonization in other settings.

Another study by the same group (Huang SS et al., JAMA 2023; 330(14):1337-1347) compared iodophor vs mupirocin for universal nasal decolonization in combination with chlorhexidine bathing in ICU patients on S. aureus in clinical cultures showing a lower rate in the mupirocin group (Hazard ratio 0.99 vs. 1.17, respectively, $p < 0.001$). However, mupirocin resistance was not assessed. In conclusion, nasal iodophor seems to be inferior to nasal mupirocin for staphylococcal decolonization.

Hand hygiene

Current guidelines require hand hygiene before donning non-sterile gloves. In a multicenter, cluster-randomized trial (Thorn KA et al., JAMA Network Open 2023; 6(10); e2336758), direct gloving (without hand hygiene) was compared to hand hygiene before donning non-sterile gloves by assessing the adherence to the expected practice at room entry and exit. At baseline, only 35% of healthcare workers performed hand hygiene before gloving (95%CI 33-37%) whereas 47% already performed direct gloving (95%CI 45-50%). During the intervention, the compliance to immediate glove use in the intervention group was 87% as compared to 41% in the routine care group (hand hygiene before use of gloves) ($p < 0.001$). Bacterial contamination of gloves in the intervention group was increased in the emergency department, but not in other unit types. Direct gloving could have benefits in terms of healthcare workers' adherence; however, the study did not have any clinical outcomes. As a practical implication, this approach might be used in units with already high infection prevention and control adherence, but should not become (yet) a general practice recommendation, without further confirmatory studies.

A study by Tremblay MA et al. (Am J Infect Control 2023; 51: 149-53) assessed the individual nurses' relative hand hygiene performance by using automated surveillance at entry to rooms assigned to individual nurses. It showed that the overall hand hygiene compliance of a ward was influenced by individual over- and underperformers. Based on these results, there is a potential value of an individualized feedback strategy to improve hand hygiene performance.

Artificial intelligence for infection prevention and control (IPC) – Prof. Andreas Widmer

Sessions:

Use of artificial intelligence to optimise infection prevention and control, Pre-ECCMID Symposium February 28 2024

AI tools transforming scientific research and communication

Two symposia focused on artificial intelligence: One specifically on infection prevention, the other also in the context of publications in medical journals. Artificial intelligence (AI) refers to the ability of computers to function in a cognitive sense similar to humans, using machine learning or other tools to build the artificial intelligence model. The bottom line was clear that AI will change the way we will work in the future. Some examples: Surveillance cameras that use AI to recognize whether healthcare worker wear surgical masks properly using a supervised deep learning model[1]. The New England Journal of Medicine has recently launched an entire issue dedicated to AI in medicine. One topic was the detection of clinically relevant infections, in particular hospital-acquired infections [1,2]. Infection prevention and control (IPC) experts can use generative AI for case definition-based surveillance, particularly using large language models (LLMs), e.g., ChatGPT-4. The use of AI can support infection prevention and control programs within existing time constraints by automating some of the time-consuming tasks that keep them from the more important patient- or provider-facing activities. AI can help saving intravascular catheter days by supporting the switch from intravenous to oral antibiotic therapy[3].

Table adapted from presentation of Richard Drew
(Use of artificial intelligence to optimise infection prevention and control, Pre-ECCMID Symposium February 28 2024)

Pros of AI for IPC	Downsides of AI for IPC
• Works 24/7/365 • Excellent for repetitive tasks • Big data analyses – Cluster patterns almost impossible by manual statistical analyses – Risk factor patterns	• 24/7 push information • No local context knowledge • Systems not easily transferable between institutions depending on their problems • Ethics and Bias • Data protection • Even more work at the computer for IPC-staff • Access to large databases necessary

The second session focused on the impact of AI on medical information: Ursula Hofer, Editor-in-chief of the Lancet Infectious Diseases, summarized pros and cons of using AI for publications. Authors – in particular those with English as second language – can clearly improve readability of their publications by, e.g., ChatGPT-3.5: Hwang T et al showed a 62% improved readability in 62 high-impact papers, but reporting that quality dropped by 34%[4]. However, ChatGPT added invented "information", if it possibly had no information stored on that topic, called hallucinations. The potential benefits of AI are that it saves time, improves language, identifies novel research, and supports education should and will be used, but the use of such tools must be transparently reported.

Ilan Schwartz focused on the risks of AI: Currently, the most sophisticated AI systems exceed the general human brain capacity as they win at chess competitions, and are able to pass US medical examinations with an accuracy of 86.5%.

An exciting new tool is the option to change the language of a recording, e.g., from a talk on infection control. Synthesia as an example mimics the lips of the speaker and you get the impression that the original speaker is able to talk in a different language, but the video has undergone AI transformation allowing to facilitate teaching in foreign languages for hospital employees. Most hospitals have employees from more than 80 countries, where such a tool can make teaching much easier and effective. The downside of such powerful tools is the potential abuse. The World Economic Forum 2024 in Davos defined mis- and disinformation as the highest risk for society for the next two years. As an example, such tools can generate fake information for a blog such as "sunscreen lotions cause skin cancer": more than 80% of the systems generated 113 unique blogs to support such a statement in less than one hour[5]. "Influencer" can use such tools to spread fake information, e.g., on serious side effects of vaccines or – on a poster at the June 24 voting – that WHO is empowered to euthanize your pet in case of a new pandemic using AI generated arguments for justification.

It is too early to evaluate all pros and cons of AI: However, it is clear that we have to learn how to use this new technology for our purposes, but also realizing the danger of fake news, fake research results, pictures, and videos mimicking real world facts.

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