automated environment disinfection with significant quality assurance as compared with those of manual cleaning and disinfection, which include chloride such as slightly acidic hypochlorous acid water or titanium dioxide. Of them, Bio-Kil (Cargico Group, Taiwan) is a platform nanotechnology with construction of quaternary ammonium compound to create a covalent or ionic bond and embedded into the surfaces of environment, forming a durable copolymer with a physical bactericidal property. A pilot study in intensive care units had shown that the Bio-Kil treatment can inhibit the growth of bacteria and evidently suppress its colonization from 49.62 to 10.38 CFU/10 cm². Today we will present further study of its effectiveness on controlling the colonization of MDROs in the hospital settings. Together with hand hygiene campaign and other infection control bundles, there is a new horizon for us to achieve the zero tolerance of HAIs in the 21st century.

SP 20-3
PROACTIVE INFECTION CONTROL MEASURES TO PREVENT NOSOCOMIAL TRANSMISSION OF VRE
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We adopted a multifaceted assertive proactive infection control approach to minimize the nosocomial transmission and outbreak of VRE in a non-endemic area. Active surveillance culture, extensive contact tracing and single room isolation with contact precautions, together with other infection control measures, such as directly observed hand hygiene in conscious patients before receiving meals and medications, stringent hand hygiene during patient care practices, and environmental cleanliness are essential in limiting intra- and inter-hospital transmission. With the implementation of these infection control measures, the incidence of nosocomial acquisition of VRE had significantly decreased from 0.46 per 10,000 patient-days to 0.10 per 10,000 patient-days (p < 0.001 under Poisson assumptions).

SYMPOSIUM 21 (SP 21)
ANTIBIOTIC STEWARDSHIP

SP 21-1
BENEFITS OF ANTIMICROBIAL STEWARDSHIP IN HOSPITALS: EVIDENCE FROM A RECENT COCHRANE REVIEW
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Antibiotic stewardship has been around now for several decades but has received renewed focus as a means of slowing the development of antibiotic resistance (AR). Cochrane reviews include only papers of sufficiently robust methodology and at the date of the last review (2006) there were less than 100 published scientific papers so classified on Antibiotic Stewardship. In recent years a greater proportion of published papers have been included but almost all are from USA and Europe. The majority use interrupted time series analysis, with about a quarter being randomised controlled trials. Currently a new review is updating the data basis and I will include data from many of these papers in this talk.

Restrictive interventions such as order forms and expert approval have a more immediate effect than persuasive (educational) interventions such as audit and academic detailing but the effects of both are well maintained over at least 2 years. Most are delivered by multidisciplinary teams, followed by id/micro and pharmacists.

There is robust evidence that effective stewardship, leading to major reduction (34-42%) in the use of key agents such as quinolones and cephalosporins can reduce *Clostridium difficile* infection, MRSA, VRE and multi resistant Gram negatives by 24-68%. Lessons can be learnt from this data for the control of carbapenemases. Also, improved quality of use can reduce mortality from CAP. No associated increases in mortality, length of stay or infection specific re-admission have been documented.

In summary, antibiotic stewardship has a valuable role to play, alongside hand hygiene and surveillance/cohorting/isolation/suppression/decolonization in the control of Multi-Drug Resistant Organisms (MDROs).

SP 21-2
SCALING UP EVIDENCE-BASED INTERVENTIONS TOWARD SUSTAINABILITY: A CASE STUDY OF ANTIBIOTICS SMART USE PROGRAM IN THAILAND
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Purpose: The ability to scale up health programs after the pilot project or seeding funds ended has gained interest from health professionals, policy makers and funders. Lessons learned from the Antibiotics Smart Use (ASU) program might be useful. ASU aims at reducing antibiotic use in upper respiratory infection, acute diarrhea and simple wound. Phase I tests interventions (2007-8). Phase II assesses scaling-up feasibility (2008-9). Phase III scales up ASU toward sustainability to achieve new social norms (2010-present). The study aims at investigating ASU diffusion, scaling-up measures and factors contributing to ASU adoption and sustainability.

Methods: ASU diffusion and factors regarding ASU adoption was assessed by a mailed, self-administered survey for all hospitals. Scaling-up measures and factors contributing to ASU continuity were assessed using previous ASU evaluation research and in-depth interviews of 50 key informants from 15 ASU settings. Data were collected during May—October 2014.

Results: Of 625 hospitals (response rate 52%), 91% were aware of ASU and 72% implemented ASU. The ASU adoption rate was 3% in 2008 and increased to 17%, 25% and 27% during 2010-2012. Scaling up started with a model development and followed by horizontal and vertical scaling-up measures. Horizontal measures included building decentralized networks to promote local ownerships. Vertical measures focused on integrating ASU into national policies. The pay-for-performance policy by the National Health Security Office in 2009 greatly induced scaling-up. Factors involving ASU adoption included to solve irrational use of medicines, to do the right thing, and to improve quality of care. ASU continuity required ASU prime mover(s), management in hospitals, and external factors especially national policies.

Conclusion: ASU scaling-up starts with a model development and follows by horizontal and vertical scaling-up measures. Despite limited resources, ASU continues scaling up but its sustainability remains challenging as it needs strong, long-term support from relevant national policies.

SP 21-3
HOSPITAL INITIATIVES
Ching-Tai Huang, LinKou Chang Gung Memorial Hospital, Taiwan
No abstract.

SP 21-4
AN INTERNATIONAL APPROACH TO ANTIMICROBIAL STEWARDSHIP: EXAMPLE FROM VIETNAM
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Antimicrobial resistance is a major global health threat. In the European Union an estimated 25,000 deaths occur annually secondary to multi-drug-resistant infections. No reliable estimates for developing countries exist, but figures are likely to be higher. Strategies to contain antimicrobial resistance were comprehensively set forth by the World Health Organization (WHO) in 2001. However, implementation in low- and middle-income countries, where the need for effective antimicrobials is greatest, has thus far proved problematic [3],[4].

In Viet Nam, where resistance rates are among the highest in Asia, the challenge is urgent and great. A large population, high infectious disease burden, and unrestricted access to antimicrobials make Viet Nam a hotspot for the emergence of drug resistance. Adequate legislation to tackle antimicrobial resistance in Viet Nam already exists, but a lack of resources prevents effective policy enforcement.
Growing global consensus that antimicrobial resistance must be tackled provides opportunity to intervene. Interventions must account for limited resources available in many regions with the highest resistance burdens. In response to this we launched the Viet Nam Resistance (VINARES) project, a capacity-building initiative designed to strengthen antimicrobial stewardship in Viet Nam. The framework of VINARES may be transferrable to other settings, and emerging economies in particular. During my talk I will present our findings during the VINARES project.

Summary Points

- Antimicrobial stewardship has been difficult to implement globally, and in emerging economies it is usually absent or inadequate.
- Implementation of antibiotic stewardship programmes need not wait for “perfect local data” or funding. There is often sufficient local expertise to start a programme in the absence of additional resources. No immediate impact on resistance levels should be expected.
- Antibiotic resistance is partly the result of a dysfunctional health system. Long-term commitment is necessary to improve healthcare infrastructure in order to establish a successful antibiotic stewardship programme and reduce resistance rates.
- Healthcare professionals, preferably “respected” figures, should coordinate stewardship programmes. The programmes should be context-tuned and compatible with local practices to encourage engagement and compliance of all healthcare workers.

**WHAT’S THE EVIDENCE FOR AND AGAINST USE OF CHLORHEXIDINE FOR PREVENTION OF HEALTHCARE-ASSOCIATED INFECTIONS?**

**DOSE CV CARE BUNDLE WORK IN CENTRAL LINE ASSOCIATED BLOOD STREAM INFECTION (CLABSI)? – TAKE TAIWAN AS AN EXAMPLE**

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Central line associated bloodstream infection (CLABSI) is an important issue in healthcare-associated infection (HAI). The use of catheter is an inevitable device in hospital. According to the data of Taiwan Nosocomial Infection Surveillance (TNIS), bloodstream infection (BSI) is one of the most common HAI in intensive care unit (ICU) and above 70% are associated with the use of catheter. This presentation is to show the result of central venous catheter (CVC) care bundle campaign in preventing CLABSI in the past four years in Taiwan. The CVC care bundle campaign had two stages. The first stage belonged to pilot study that initiated from 2010 to 2012. There were 26 ICU with 432 beds from 14 hospitals of different areas of Taiwan. The second stage was called promoted stage, started from 2013 to 2014 that included 50 hospitals with 133 ICU and 1700 beds. The data collection of CLABSI rate included before and after CVC care bundle intervention. The contents of CVC care bundle included 5 elements and two checklists of insertion and daily care of CVC. The definition of CLABSI is at least one significant positive blood culture with central catheter in situ or within 48 hours after catheter removing and had to exclude the secondary BSI. The CLABSI rate in the pilot study was 5.81% and 5.16% before and after intervention with 11.2% reduction only. The result showed 46 CLABSIwere avoided and it estimated 23,000 USD medical cost was saved (Extra-medical cost is about 5,000 USD per one CLABSI in Taiwan). At the second stage the CLABSI rate was declined from 5.61% to 3.33% before and after 19 months intervention with 40.6% reduction. The result showed 643 CLABSI were avoided and it estimated 3,215,000 USD medical cost was saved.

Currently, there are some evidence based guidelines concerning the good prevention of CLABSI by CVC care bundle (usually decreased 40–60%). Our result 40.6% is approached to the low margin that reported by the references. The important reasons are the compliance and consistency to the care bundle is not so satisfactory that included the high femoral site insertion, failure to scrub the hub in sufficient time and also high CVC utilization rate. These will be emphasized in the further CVC quality promotion campaign when more hospitals will be recruited.

**USE OF CHLORHEXIDINE TO PREVENT SURGICAL SITE INFECTIONS**

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The effectiveness of chlorhexidine (CHG) over iodophor (IP) has been extensively investigated and demonstrated for the prevention of catheter-associated bloodstream infection. However, its effectiveness toward the prevention of surgical site infection (SSI) is controversial. Numerous researches have been performed to address this profound question to perform the meta-analysis. However, there are many barriers which prevent us from doing it. First, there are many types of antiseptics available for preoperative skin preparation: CHG, CHG-alcohol, aqueous IP, IP-alcohol, etc. with various concentrations (0.5%, 1%, 2%, etc.). Second, the effectiveness of specific skin preps is expected to vary depending on the type of operation, i.e., whether it is a clean surgery or clean-contaminated one. Third, the outcomes of the studies are different from each other, i.e., whether it is incisional SSI only, or incisional and organ space SSI.

The Writing Committee of the Updated CDC/HICPAC SSI Prevention Guideline carefully examined the available evidence with regard to this area, and did the systematic review and analysis comparing CHG with IP by adjusting other factors such as addition of alcohol and number of prep-steps. Their result reviewed in hardly any difference in comparison of CHG with IP. The drawback of their review is that they did not separate clean surgery and clean-contaminated surgery.

Noorani et al. did the meta-analysis using data from the clean-contaminated surgery (Noorani A, et al. Br J Surg 2010;97:1614-20), and found that CHG is superior to IP in preventing SSI (OR 0.56, 95% CI: 0.49-0.68). However, the addition of alcohol to the antiseptics varied among the studies included in this meta-analysis. Further study is needed to examine the effectiveness of CHG over IP.

**PREVENTION OF VENTILATOR-ASSOCIATED PNEUMONIA**

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Ventilator associated pneumonia (VAP) is associated with significant mortality, increased length of stay and increased costs of care. While the true incidence of VAP has been difficult to establish due to surveillance definitions and methods and other serious complications associated with mechanical ventilation such as acute respiratory distress syndrome, it is estimated that up to fifty-five percent of VAP cases may be preventable with the implementation of current practice guidelines/recommendations.

In the US it has been estimated that if best practices were applied in all hospitals the number of avoidable/preventable VAP infections would range from 95,526 - 137,613 per annum and that 13,667 - 19,782 lives could be saved. Current basic practice guidelines/recommendations in the adult settings include; avoiding intubation if possible, minimising sedation, maintaining and improving physical conditioning, minimising pooling of secretions above the endotracheal tube cuff, elevation of the head of the bed and maintenance of ventilator circuits. In addition there are special approaches or interventions in the settings where a hospital VAP rates are not reducing despite demonstrated high compliance with basis practices. These additional approaches may have insufficient data at this point in time to determine the impact on mortality, duration of mechanical ventilation and length of stay. Strategies to implement guidelines/recommendations including the “four Es”**: engagement, education, execution and evaluation will be discussed along with current practice guidelines/recommendations to improve their use at the bedside.