■ Proceedings

Conference on Infection Prevention and Control in Cannes 2010

1835 White Palm Hotel, Cannes　8 July 2010
Tokyo Healthcare University Postgraduate School

INVITED LECTURE

10：30 – 11：30　　Chairperson：Kobayashi H

Spaulding classification: time to challenge our beliefs on the studies of emerging pathogens?

Gerald McDonnell, BSc PhD
Vice President, Research & Technical Affairs, STERIS Limited

Biography

Dr. Gerald McDonnell is a Vice President for STERIS Corporation, based at their European headquarters in the U.K. STERIS is a worldwide provider of infection prevention and contamination control products for the healthcare, pharmaceutical, defence and industrial areas (www.steris.com). Dr. McDonnell has a B.Sc. (Hons.) in Medical Laboratory Sciences from the University of Ulster and a Ph.D. in Microbial Genetics from Trinity College Dublin. He has worked for STERIS for 13 years in the United States and Europe on the development, research and support of infection prevention products and services, including cleaning, antisepsis, disinfection and sterilization methods. Dr. McDonnell is currently responsible for product development activities for STERIS in Europe including facilities in the UK, France, Finland and Switzerland. This includes cleaning, disinfection and sterilization product development and support of existing products, including training on various aspects of decontamination. His basic research interests include infection prevention, decontamination microbiology, emerging pathogens and the mode of action/resistance to biocides. He is a frequent presenter at international conferences and is a member of working committees developing US and international standards/guidelines. His publications include a book with the American Society of Microbiology entitled ‘Antisepsis, Disinfection and Sterilization: Types, Action and Resistance’

PROGRAMME

Oral Session 08:30 - 10:10 11:40 - 12:30 Chairpersons：Okubo T, Kajiura T

1. An investigation in the cleaning of special instruments

Takako Kami , Hiroyoshi Kobayashi, Takashi Okubo, Takumi Kajiura

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

2. A study on the events that can break maintenance of sterility of devices.
Ethanol can be the source of trouble!

Nobutaka Tsurushima, Hiroyoshi Kobayashi, Takashi Okubo, Takumi Kajiura

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

3. How definitely was the care bundle observed?

Masashige Sasaki, Hiroyoshi Kobayashi

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

4. Medical equipment parts washing with a sponge

Erisa sugawara[1)] Hiroyoshi Kobayashi[1)] Takumi Kjiura[1)] Takashi Okubo[1)] Shigeharu Oie[2)] Hirohisa Endo[1)] Chie Takeuchi[1)] Yuhei Saito[2)] Masashige Sasaki[1)] Atsuko Takahashi[1)] Satoru Ugagin[1)] Nobutaka Turushima[1)]

1) Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

2) Yamaguchi University Hospital

5. Surgical hand hygiene in Japan

Rika Yoshida, Hiroyoshi Kobayashi, Takashi Okubo

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

6. Cleaning of loan instruments before use in clinical setting

Etsuko Okazaki, Hiroyoshi Kobayashi

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

7. The study on bacterial survivability after inoculation on the skin

Yoshiro Sogawa, Hiroyoshi Kobayashi, Takumi Kajiura

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

8. Cross- r eaction of ethanol in the contact skin diseases due to ethanol

Hirohisa Endo, Hiroyoshi Kobayashi, Takashi Okubo

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

9. Evaluation of hand-cover ratio in short time and a small volume hand hygiene using alcohol hand rub contained fluorescence agent

Tomoko Takemoto, Hiroyoshi Kobayashi, Takashi Okubo, Takumi Kajiura
Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

10. Evaluation of an adenosine triphosphate (ATP) bioluminescence measurement kit for the medical instrument cleaning

Chie Takeuchi, Hiroyoshi Kobayashi, Takumi Kajiura, Erisa Sugawara, Yoshiro Sogawa, Hirohisa Endo, Yuhei Saito
Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

11. Strategy for inactivation of prion

Yuhei Saito[1)], Yushi Uetera[1)], Toshihiko Obayashi[1)], Takami Komatsu[1)],
Kazuhiko Fukatsu[1)], Hiroshi Yasuhara[1)], Takashi Okubo[2)], Hiroyoshi Kobayashi[2)]
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ABSTRACTS

1. Cleaning investigation of special instruments

Takako Kami, Hiroyoshi Kobayashi, Takashi Okubo, Takumi Kajiura
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There are various types of the surgical instruments and medical devices that are difficult to wash. It is necessary to choose proper method of washing the surgical instruments and medical devices according to shape. The difficulty in washing is also caused by the cleaning procedure. There is a possibility that sterilization becomes insufficient, too and the risk of infection is incontrovertible.

2. A study on the events that can break maintenance of sterility of devices. Ethanol can be the source of trouble!

Nobutaka Tsurushima, Hiroyoshi Kobayashi, Takashi Okubo, Takumi Kajiura
Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

Background and objectives : Event-Related Sterility Maintenance (ERSM) is widely used in many countries other than Japan. Instead, Timer-Related Sterility Maintenance (TRSM) is still employed in some of Japanese hospitals. And yet, factors that can break sterility of the sterilization bag have not been fully explored.
The purpose of this study is to examine the validity of Event-Related Sterility Maintenance (ERSM), and to see what kind of events can break the sterility of devices.
Methods : The test chip, was placed in sterile package, and variety of possibly contaminating challenges that can occur in our routine medical activities were simulated experimentally. These challenges included applying pressure on the container, pushing room air into the container, dropping the devices on the floor from the height

of 120cm, wetting the devices with water containing bacteria or with ethanol.

Results and Conclusion：Application of pressure on the sterilization bag and forcing room air into the sterilization bag through the insufficient seals and pin holes lead to the breaks in less than 10% of the cases. On the other hand, dropping the sterilization bag from the height of 120cm made breaks in 90% of the cases.

The most important and interesting of all, the ethanol made it easier for bacillus to penetrate the bag at the rate of 65%. Several events and their relation to the breach of sterilities were studied. Interestingly enough, ethanol made it easier for bacillus to penetrate the package.

3. How definitely was the care bundle observed?

Masashige Sasaki, Hiroyoshi Kobayashi

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

Four care bundle sheets newly developed have been used in forty-nine hospitals. The bundle sheets includes "CV Catheter Insertion Bundle," "UT Catheter Insertion Bundle," " Ventilator Bundle," and "Treatment of diarrhea/vomiting Bundle". And then they have been clinically studied again in one hundred and fifty-six hospitals after improvement.

4. Medical equipment parts washing with a sponge

Erisa sugawara[1)] Hiroyosi Kobayashi[1)] Tkumi Kjiura[1)] Takashi Okubo[1)] Shigeharu Oie[2)] Hirohisa Endo[1)] Chie Takeuti[1)] Yuhei Sitou[2)] Masashige Sasaki[1)] Atsuko Takahashi[1)] Satoru Ugagin[1)] Nobutaka Turushima[1)]

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Introduction：A sponge is often used to clean reusable equipment and materials in medical settings. However such a sponge has been reported to be contaminated with *Pseudomonas aeruginosa*[1)] . Thus, many institutions have been very cautious in the management of sponges in clinical settings. In the present study, we performed a microbial examination of sponges used for extended periods of time in our medical facilities. An appropriate amount of non- antibacterial detergent was applied to sponges, sterile Petri dishes were washed under 5 different conditions, and the colony forming units (CFUs) per dish were counted.

Methods：Cleaning conditions (1) 10-second sponge cleaning and no rinsing with water (2) 10-second sponge cleaning, 10-second rinsing with water, and no draining (3) 10-second sponge cleaning, 10-second rinsing with water, draining, and 20-minute drying at room temperature (drying on sterile paper which was placed on a metallic basket) (4) 10-second sponge cleaning, 20-second rinsing with water, and no draining (5) 10-second sponge cleaning, 20-second rinsing with water, draining, and 20-minute drying at room temperature (drying method: same as (3)).

Culture of samples from the environment of cleaning (1) Culture of used sponges which were cut aseptically (2) Culture of tap water used in washing (3) After the cleaning procedure, the person who cleaned left one gloved hand as is and hygienically washed the other gloved hand. Bacteria were collected using a stamp medium.(4) Examination of airborne particles in the environment in which the experiment was conducted.

Results：There were 10^7-10^8 CFU in each small section of contaminated sponge. There were 10^4-10^7 CFU of

these bacteria which were transferred to objects cleaned with such a sponge. Bacteria was also transferred to the gloves used in cleaning. However, the bacterial counts were reduced to 3.6-185.9 CFU after procedures using cleaning conditions (3)-(5).

Discussion：Bacteria were transferred to objects due to cleaning with contaminated sponges. These bacteria transferred to cleaned objects and hands and fingers were reduced to clinically acceptable levels by proper washing under running water and draining. Our results confirmed the importance of drying of objects after cleaning without over-management of sponges.

<Reference>

1) Oie S, Kamiya A. Contamination and survival of *Pseudomonas aeruginosa* in hospital use sponges. *Microbios* 2001; 105:175-181

5. Surgical hand hygiene in Japan

Rika Yoshida, Hiroyoshi Kobayashi, Takashi Okubo

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

Objective：To study the situation of surgical hand hygiene in Japan

Setting：1,599 Hospitals with more than 300 beds in Japan.

Methods：A questionnaire on the surgical hand hygiene was sent.

Results：The number of replies was 443 from 1,125, a ratio of 39.4%. Rubbing with alcoholic antiseptic alone was employed in 3.3%, scrubbing alone in 35.0%, and both depending on the private selection in 65.4% of the hospitals. Tap water was employed in approximately 40% of the hospitals for surgical hand hygiene.

Conclusions：Rubbing based surgical hand hygiene increased dramatically in these years. Before the law revision for surgical hand hygiene in 2002, sterilized water and scrubbing had to be employed. It was not until the law was revised that clean tap water became possible to use for surgical hand washing which resulted in the cost reduction. Rubbing with alcoholic antiseptic for surgical hand hygiene has also been available after the revision.

6. Cleaning of loan instruments before use in clinical setting

Etsuko Okazaki, Hiroyoshi Kobayashi

Division of Infection Prevention and Control, Tokyo Healthcare Universit Postgraduate School

The Japanese Association for Operative Medicine (JAOM) published the practical guideline to achieve the appropriate surgical operation in 2008. The guideline included 11 recommendations on the usage, return, and reuse processes for surgical loan instruments. In order to clear the current situation, after one year passed by the publication, survey was performed.

The JAOM guideline recommends institutions to implement loan instruments pre-cleaning routinely, however our surveillance data showed 62.5% of the institution did not implement routinely. The major reason for this was the time constraint in the clinical setting before usage. Over 70% of institution answered they did not possess enough time.

The JAOM guideline recommended provider/institution that the instruction of disassembly, cleaning, and

sterilization for each loan instrument should be develop and attached to help institution's preparation, 79.6% of surveyed institution answered "not sufficient".

The results indicate that each institution needs to recognize the risk and importance of pre-cleaning for loan instruments. Also, further effective communication and cooperation between each institution and provider are required to achieve the appropriate pre-cleaning implementation in the clinical settings.

7. The study on bacterial survivability after inoculation on the skin

Yoshiro Sogawa, Hiroyoshi Kobayashi, Takumi Kajiura

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

Background and Objectives: Bacterial inoculation method is often demonstrated in *in vivo* studies for measuring or evaluating antimicrobial efficacy. Both *Serratia marcescens* and *Escherichia coli* are the major microorganisms used, however survivability after inoculation is not well known. Our objectives were to clarify the time course of viable bacterial count for both *S. marcescens* and *E.coli* after skin inoculation and also to determine the requirements to ensure the reliability of bacterial inoculation method.

Materials and Methods: *S. marcescens* (ATCC 14756) and *E. coli* K 12 (NBRC 3301) were chosen for the study. Inoculums for both *S. marcescens* and *E. coli* were prepared at the target concentrations of 10^9/mL and 10^6/mL with phosphate buffered saline. Two healthy volunteers were recruited and three circular test sites (3.5cm diameter) were set on anterior skin of both right and left forearms. Prepared inoculums, 10^9/mL and 10^6/mL, were applied to the test sites on the right and left forearms, respectively. After 2, 5, and 10 minutes, specimens were collected using cup scrub technique from each test site. These specimens were serially diluted with sampling solution (3% lecithin and 10% polysolvate 80) and smeared on trypticase soy agar plates. Colony forming units (CFU) of each plate was calculated after being cultured for 24 hours. CFU of original inoculums of *S. marcescens* and *E. coli* were also counted in the same manner.

Results: Initial bacterial colony counts (Log_{10}CFU/site) were estimated to be 7.44 for the site inoculated with 10^9/mL *S. marcescens*, 4.44 for the site inoculated with 10^6/mL *S. marcescens*, 6.95 for the site inoculated with 10^9/mL *E. coli,* and 3.95 for the site inoculated with 10^6/mL *E. coli*. Bacterial colony counts (Log_{10}CFU) of each test site for 2, 5, and 10 minutes after inoculation were as follows: 6.57, 5.70, 5.31 for 10^9/mL *S. marcescens*, 6.40, 5.04, 4.82 for 10^9/mL *E. coli*, 3.76, 2.99, 2.66 for 10^6/mL *S. marcescens*, and 10^6/mL 3.35, 1.70, 1.40 for *E. coli*, respectively. The viable bacterial colony counts after inoculation of both bacteria drastically declined as time increased.

Discussion: Reduction of viable bacterial count was severe and survivability of these bacteria seemed to be severely influenced by the dry conditions. Bacterial count reduction (Log_{10}CFU) ranged from 1.45 to 1.74 for *S. marcescens* and 1.91 to 2.25 for *E. coli* after 5 minutes, and from 1.73 to 2.13 for *S. marcescens* and 2.13 to 2.55 for *E. coli* after 10 minutes. When 10^6/mL was inoculated, viable bacterial count for these bacteria fell below 3 (Log_{10}CFU), even at 5 minutes after inoculation. This is considered to be inappropriate for the reliable evaluation of antimicrobial activity. Meanwhile, it appears that sufficient bacterial count remained even after 10 minutes when 10^9/mL was inoculated.

The results of this study suggest that for bacterial inoculation technique when performing antimicrobial evaluation, bacterial inoculums should be prepared at an appropriate concentration of around 10^7 CFU/site when inoculated on the site. Also, specimen samples should be collected within 5 to 10 minutes after inoculation.

Furthermore, the control should be placed not only for antimicrobial evaluation but also for viable bacterial count monitoring to ensure reliability.

8. Cross-reaction of ethanol in the contact skin diseases due to ethanol

Hirohisa Endo, Hiroyoshi Kobayashi, Takashi Okubo

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

Objectives：This present study aims to compare Orientals and non-Orientals in the characteristics of contact skin diseases due to ethanol and cross reaction of ethanol in the previous studies.
Methods：The cases of contact skin diseases due to ethanol were collected from the literature. The search involved databases of Ovid MEDLINE(R): 1950 to Sept. Week 2, 2008, CINAHL: 1982 to Sept. Week 3, 2008, and Japana Centra Revuo Medicina: 1983-Sept. 16, 2008. 16 reports on 59 Oriental cases and 8 reports on 11 non-Oriental cases were examined in this study.
Results：Among the Oriental personnel, thirty-eight cases with contact urticaria, eighteen cases with allergic contact dermatitis, and two cases with both of contact urticaria and allergic contact dermatitis were reported. A case with contact urticaria and irritant dermatitis was found. In every eleven cases among the non-Oriental, allergic contact dermatitis was reported. Between ethanol and a primary or secondary alcohol, there was a tendency to be lower cross-reaction rates in the Oriental than the non-Oriental. In addition, the Oriental had high cross-reaction rates with ethanal. There was no report on cross-reaction with ethanoic acid in either Oriental or non-Oriental.
Conclusion：Many non-immune skin reaction due to aldehyde dehydrogenase 2 deficiency may be included in the Oriental cases. This fact makes it difficult to prove the cause of contact skin diseases due to ethanol in the Oriental cases.

9. Evaluation of hand-cover ratio in short time and a small volume hand hygiene using alcohol hand rub contained fluorescence agent

Tomoko Takemoto, Hiroyoshi Kobayashi, Takashi Okubo, Takumi Kajiura

Division of Infection Prevention and Control, Tokyo Healthcare University Postgraduate School

Hand-cover ratio in short time and a small volume was investigated using alcohol hand rub contained fluorescence agent in this study. Hand sanitation volume with alcohol hand rub was assumed for 0.2, 0.5, 1.0, 1.5mL in the actual hand sanitation volume in this study, which might be reflected in short time in the clinical settings. Each small volume of alcohol hand rub was also assumed each for 3, 5, 7, 15 seconds sanitation, respectively. After implementation of hand sanitation for 3, 5, 7 and 15 seconds, emission area of each hand was investigated and evaluated.

Obtained results showed the hand-cover ratio was expanding with the duration of hand sanitation and the volume of alcohol hand rub. Accordingly, it was suggested that the relation between duration of hand sanitation or applied alcohol hand rub volume and hand-cover ratio would be evaluated effectively.

10. Evaluation of an adenosine triphosphate (ATP) bioluminescence measurement kit for the medical instrument cleaning

Chie Takeuchi, Hiroyoshi Kobayashi, Takumi Kajiura, Erisa Sugawara, Yoshiro Sogawa, Hirohisa Endo, Yuhei Saito

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Objectives：In this study, we examined the sensitivity of the ATP measurement kit against *Serrtia marcescens* and *Baccillus subtilis*.

Methods：Each bacterial suspension was prepared at the target concentration of 10^5, 10^6, 10^7, and 10^8 with a phosphate buffered saline (PBS). And 100μL of each bacterial suspension was set in UXL100 swab, a chemical reagent for ATP measurement kit, and readings were taken in relative light units (RLU) over time.

Results：Log_{10}RLU of each suspension of *S. marcescens* showed gently increase until 200 seconds, and then kept almost same value (steady state). RLU was increased in accordance with the concentration of bacterial suspension. On the other hand, log_{10}RLU of each suspension of *B. subtilis* did not show any change until 100 seconds. The maximum vale was 2.10 log_{10}RLU. The correlation between the quantity of ATP and the quantity of bacteria was not clear.

Discussions：Results suggest that the sensitivity of the ATP measurement differs by the bacterial strain, and the quantity of ATP in each bacterial strain may differ. We plan to continue to study on the sensitivity of ATP assay method against various different bacterial strains and protein in order to determine whether the method is useful for evaluating washing procedure.

11. Strategy for inactivation of prion

Yuhei Saito[1)], Yushi Uetera[1)], Toshihiko Obayashi[1)], Takami Komatsu[1)],
Kazuhiko Fukatsu[1)], Hiroshi Yasuhara[1)], Takashi Okubo[2)], Hiroyoshi Kobayashi[2)]

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Creutzfeldt-Jakob disease and other human transmissible spongiform encephalopathies (TSEs) are caused by prion, which is resistant to most of conventional sterilization methods. TSEs can be transmitted via surgical instruments, if the infectivity of TSE prion remains on them. A lot of studies had been reported and there have been many evidence based methods to have prion lose its infectivity. There are several guidelines which refer to decontamination and inactivation of surgical instruments used for TSEs and suspected patients. We reviewed these studies and guidelines to make a guidepost for healthcare facilities to help them introduce appropriate prion inactivation methods. We collected literature on decontamination and inactivation of prion by electronic search, and guidelines published in several countries via the internet on the same theme. Studies on prion inactivation are increasing in this decade, so that there are many effective chemicals and sterilization processes reported on journals. Some of them are available to healthcare facilities for daily use, and the others are not. Prion inactivation process in healthcare facility must be evaluated in two ways of perspective; the first is the effectiveness of decontamination and inactivation, and the second is the availability for healthcare facilities. The risk of transmission of TSEs by surgical instruments can be reduced by using evidence based decontamination and inactivation methods. They are composed of appropriate cleaning and sterilization processes available for most of healthcare facilities.