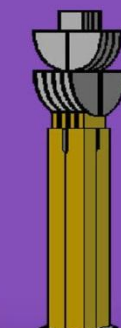


港島西醫院聯網 Hong Kong West Cluster



Coating the Ward Environment with Visible Light Activated Photocatalyst Can reduce the Hospital Acquired Infection Rate



Chiu HY¹, Leung HB², Kwok HY²

¹ Central Nursing Department, HKWC

² Department of Orthopaedics and Traumatology, HKWC

It works!

Introduction:

Is there room for improvement in our current infection control strategy?

- At any time, 6-10% in-patient suffered from hospital acquired infection.^{1,2}
- Current infection control relies on index case isolation and vector control (hand hygiene).
- Compliance is not optimal (and will hardly be perfect).
- Little attention is paid to a cleaner and safer environment.

Is the ward environment safe?

- Ward environment is known to serve as a secondary reservoir for pathogen.
- No bed fulfill microbiological hygiene standard under routine housekeeping.²
- Even decontamination procedure cannot guarantee disinfection.²

What if ?

- A material that is safe to patient but lethal to microbial, long lasting and inexpensive, can be used to spray coat the ward environment.

Visible light activated photocatalyst

- Commercial product with good safety profile.
- It decomposes all organic material if illuminated by visible light.
- > 99% bactericidal rate for wide spectrum of bacteria and virus.
- Recommended by Japan and Malaysian government for infection control in the community.⁴

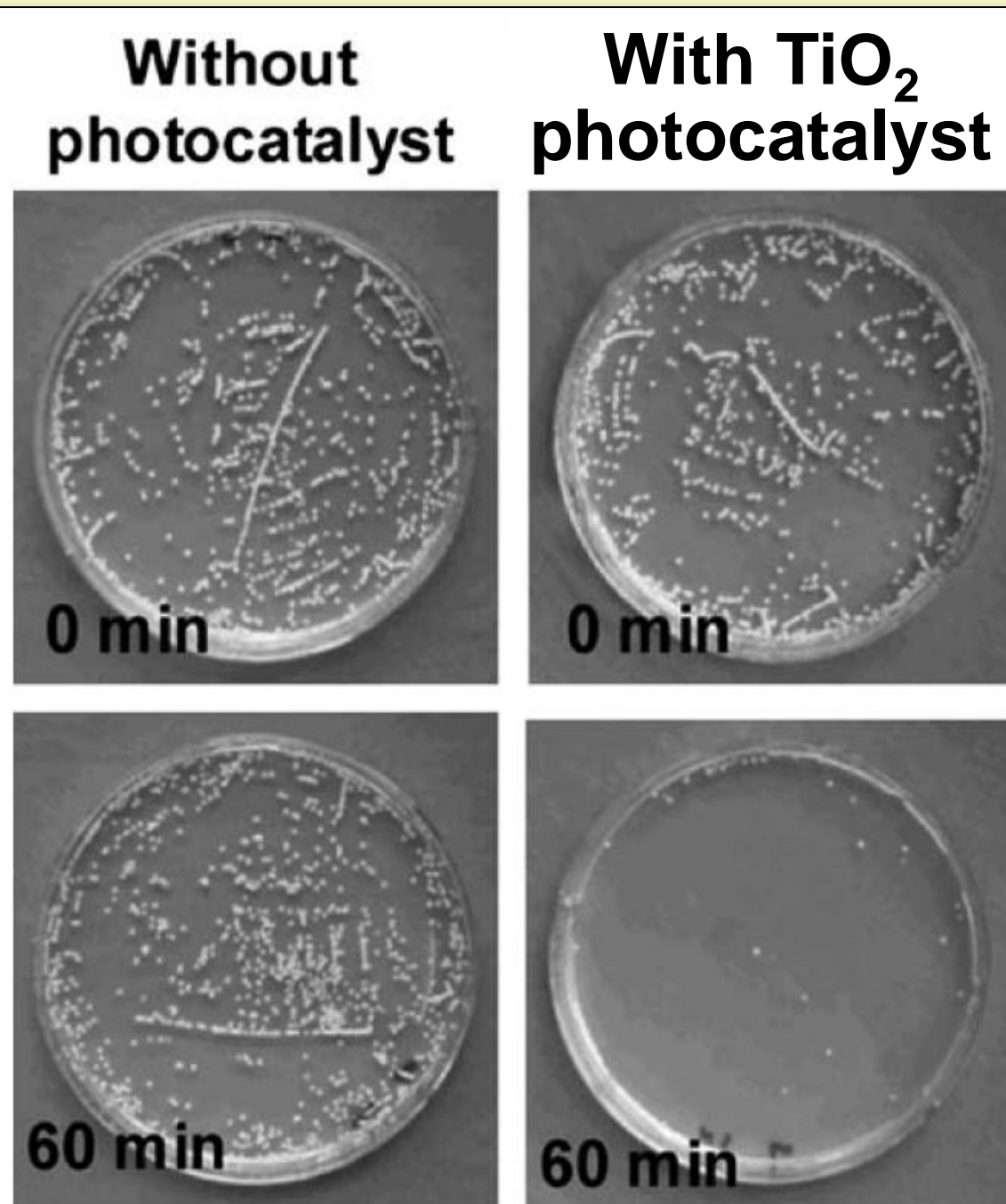
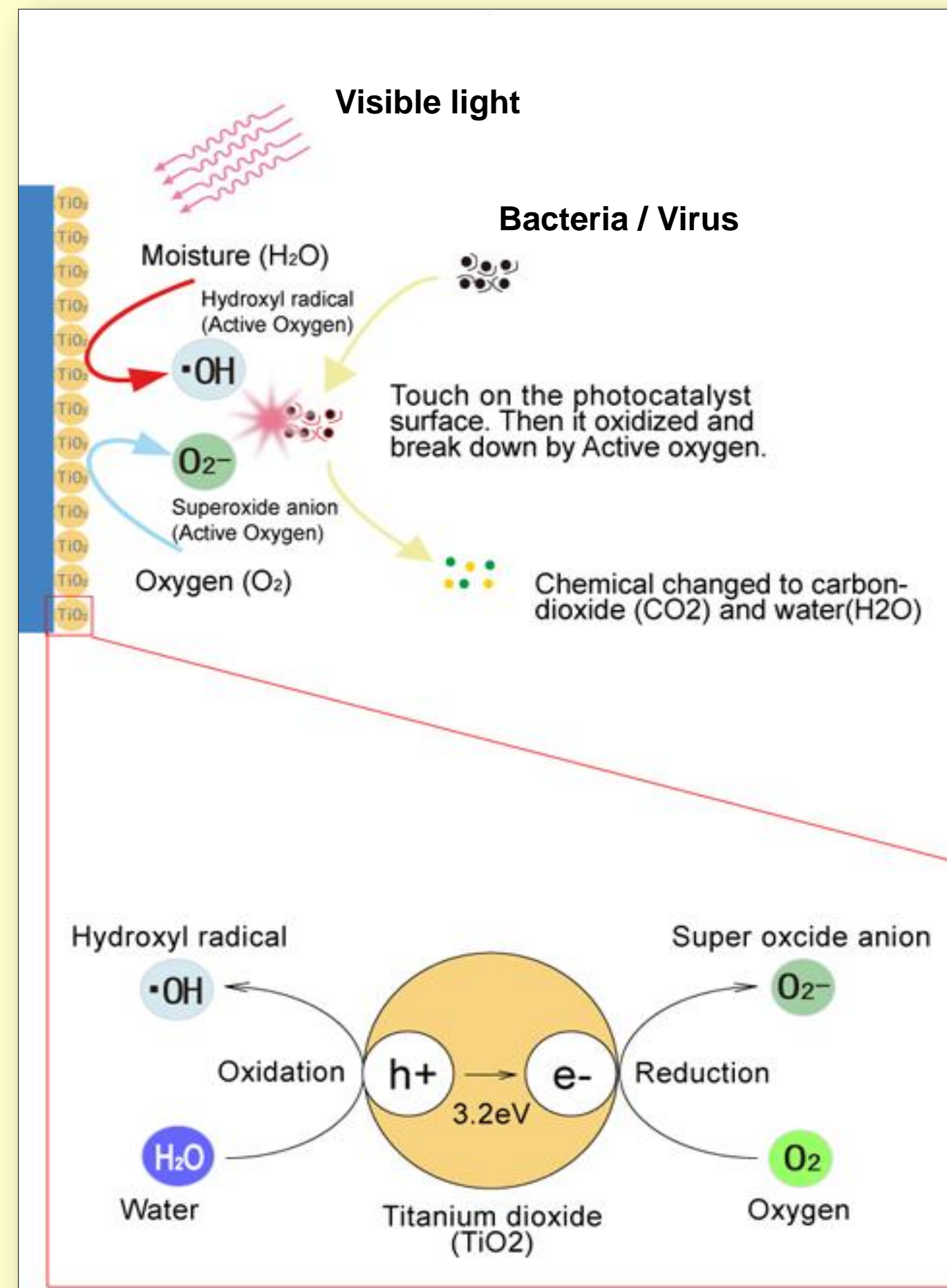


Fig. 2 Images of *M. lylae* colonies on an agar plate before and after visible light irradiation

Methodology:

Study group:

- Patients admitted to the 2 coated cubicles of the male orthopaedic rehabilitation ward in Sandy Bay.
- Coated area included wall, door, handle, furniture, and mattress.

Control group:

- Patients admitted to 2 uncoated cubicles of the same ward.

Outcome:

- Environmental cleanliness was monitored by Hygeina SystemSure Plus ATP luminometer.
- Clinical outcome included surgical site infection (SSI) rate, influenza like infection (ILI) rate, pneumonia, urinary tract infection (UTI) rate. Episodes of fever and use of antibiotics were also recorded.

Study period:

- From August-2010 to March-2011.



Fig.3 Hygeina SystemSure Plus ATP luminometer

Result:

106 patients were recruited in the study, contributing a total of 1589 bed-day. The mean age was 78.6 year-old, of no significant difference between the groups.

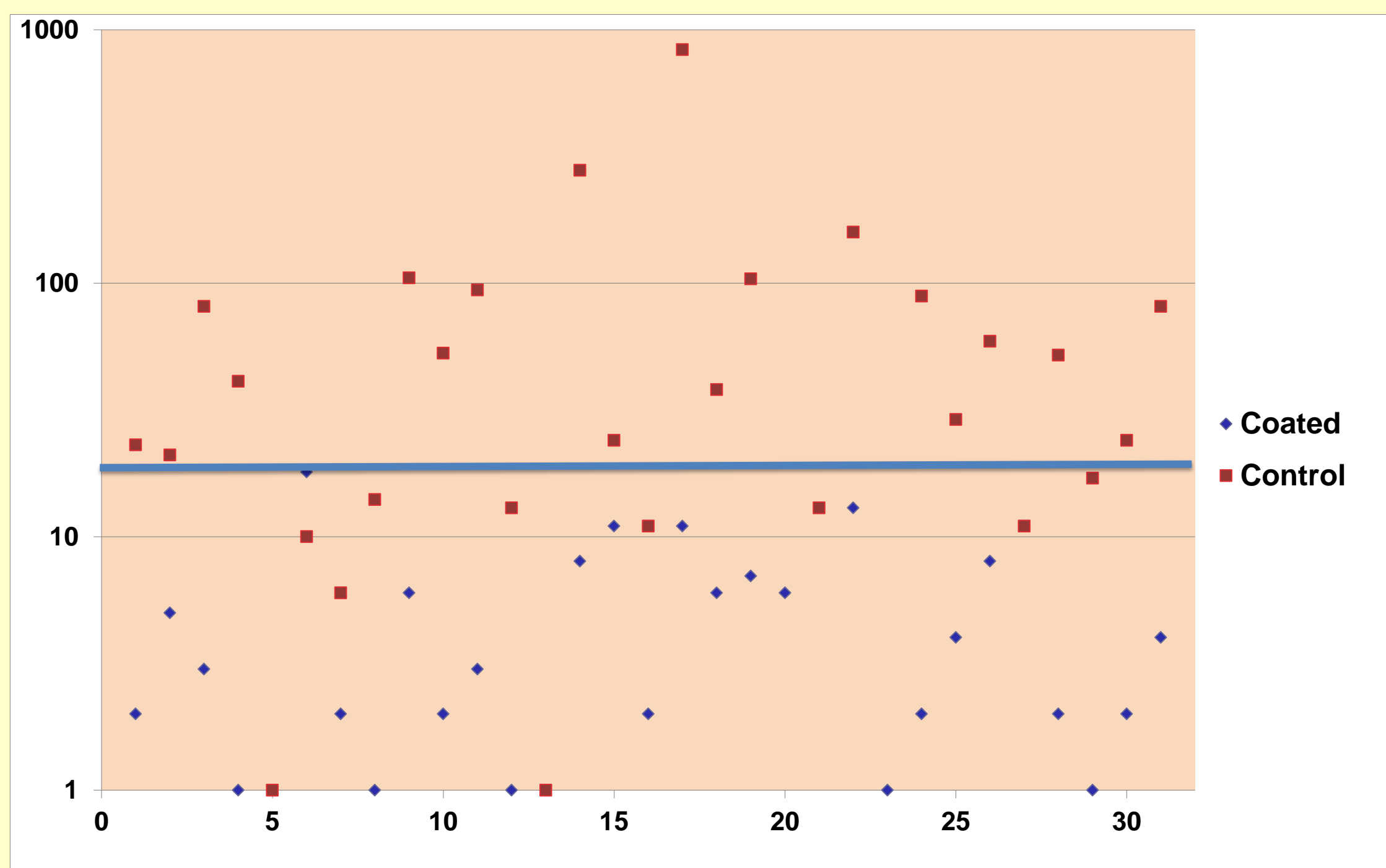


Fig. 4 Environmental microbial load on high touch surface in coated and control cubicles, in terms of ATP measured in RLU. Hygiene standard is 30 RLU, marked by blue line. Median RLU 4.3 (coated) versus 73.8 (control) Mann-Whitney U-test showed p=0.000

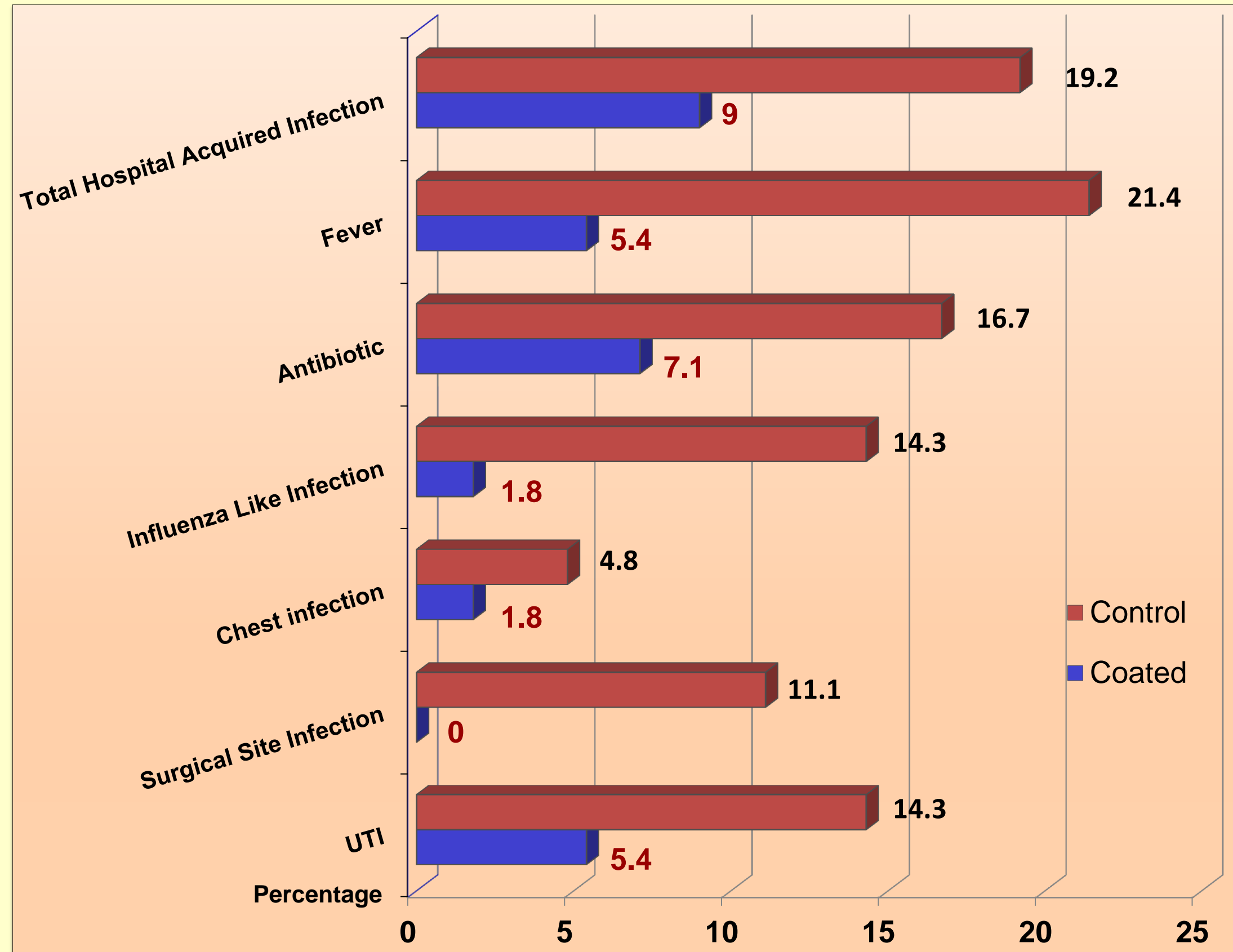


Fig.5 Risk of hospital acquired infection, fever and use of antibiotic for patients admitted to coated cubicles versus control group. Chi-square test showed p = 0.000 for all clinical outcomes

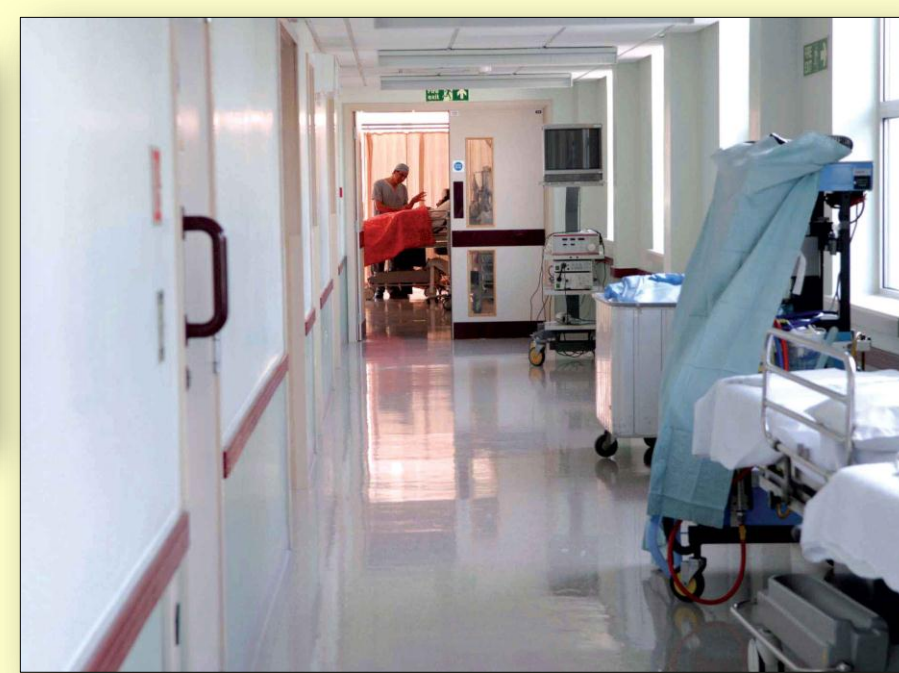
Conclusion:

Visible light photocatalyst can reduce **94.2%** of the total microbial load of ward environment.

A **53.2%** reduction in hospital acquired infection rate is noted in patient admitted to the visible light photocatalyst coated cubicles.



Fig. 6 Spraying of photocatalyst to hospital bed



Reference:

- Gravel D, Taylor G, Ofner M, et al. Point prevalence survey for healthcare-associated infections within Canadian adult acute-care hospitals. *J Hosp Infect.* Jul 2007;66(3):243-248
- Lee MK, Chiu CS, Chow VC, Lam RK, Lai RW. Prevalence of hospital infection and antibiotic use at a university medical center in Hong Kong. *J Hosp Infect.* Apr 2007;65(4):341-347.
- Leung HB, Chiu HY, Kwok HY. Environmental microbial contamination in Orthopaedics Ward before and after cleansing. Is it really clean? HA convention 2010
- Manufacturer homepage. <http://www.arc-flash.tw>

Acknowledgement

The project was financially supported by the research grant of the Hong Kong Orthopaedic Association

Quest for Excellence

