Institution: DE MONTFORT UNIVERSITY

Unit of Assessment: 3

Title of case study: Surgical site infections: surveillance, reduction and prevention

1. Summary of the impact (indicative maximum 100 words)

Prof Tanner's research on surgical site infections (SSIs) has had a direct impact on both patient care and policy at local, national and international levels. It has resulted in a reduction in the number of SSIs, thus improving patients' quality of life, shortening lengths of stay in hospital and making substantial cost savings for the NHS. The research has led directly to the development of policy and guidelines for various bodies including the World Health Organisation, the Department of Health, NICE and the Joint Commission Accreditation Healthcare Organisations (USA), as well as locally in a number of NHS trusts. The post discharge SSI surveillance programme pioneered by Prof Tanner has led to an increase in the number of trusts in the UK undertaking post discharge surveillance.

2. Underpinning research (indicative maximum 500 words)

The research underpinning this case study derives from several studies led by Prof Tanner, Professor of Clinical Nursing Research at De Montfort University since 2006. The primary study was an SSI surveillance study designed by Prof Tanner and implemented at the University Hospitals of Leicester NHS Trust in 2008 among 400 patients having breast surgery or colorectal surgery. This surveillance study was unique because it used active patient follow up for 30 days. The study found that the number of SSIs identified using this method was several times higher than the rates reported by the national SSI surveillance programme (27% and 10% for colorectal and breast respectively, compared with the national rates of 10% and 1%). In addition, many SSIs presented after patients had been discharged from hospital and each SSI cost several thousand pounds to treat, with many infections treated by primary care services.

The discrepancy between SSI rates from Prof Tanner's UHL study and SSI rates reported by the national surveillance programme led Prof Tanner to conduct a national survey of acute trusts in England in 2012 looking at SSI data collection methods. SSI rates are important as they are used for benchmarking and there are penalties for hospitals with high SSI rates. This survey, with data from 107 of the 156 trusts in England found a wide range of differences in the quality of the data and the collection methods used. The survey provided evidence that the national SSI surveillance programme under-reported SSI rates and showed the inappropriateness of using national data for benchmarking hospitals.

In addition to identifying the huge scale of SSIs and substantial cost to the NHS, Prof Tanner also undertook several studies to investigate the effectiveness of clinical interventions to reduce SSIs. This included leading three systematic reviews for the Cochrane Collaboration. The review of pre-operative hair removal, which was originally conducted in 2006 and updated in 2011, included 14 trials. This was the first review to find that hair should not be routinely removed from the incision site and, if hair had to be removed, fewer SSIs were caused by using clippers rather than razors. The review of surgical gloves to reduce SSIs was published in 2002, updated in 2006 and included 31 trials. This review found overwhelming evidence that wearing two pairs of gloves significantly reduced the risk of glove perforation resulting in fewer SSIs. It also established the effectiveness of glove perforation indicator systems. The review of the surgical hand scrub was published in 2008 and included 10 trials. It found that traditional scrubs were as effective as alcohol rubs and that there was no evidence to support the use of nail brushes (which are advocated in national guidelines).

3. References to the research (indicative maximum of six references)

* Tanner J, Kiernan M, Leaper D, Padley W, Norrie P, Baggott R 2013 A benchmark too far: findings from a national survey of surgical site infection surveillance. Journal of Hospital Infection 83 87-91

*Tanner J, Khan D, Ball J, Aplin, Thomas M, Bankart J 2009 Post discharge surveillance to identify colorectal surgical site infection rates and costs. Journal of Hospital Infection 72 243-250.

*Tanner J, Moncaster K, Woodings D 2006 Preoperative hair removal to reduce surgical site infection. The Cochrane Database of Systematic Reviews. John Wiley and Sons, Issue 3

Tanner J, Parkinson H 2006 Double gloving to reduce surgical cross infection. The Cochrane Database of Systematic Reviews. John Wiley and Sons, Issue 3

Tanner J, Swarbrook S, Stuart J 2008 Surgical hand antisepsis to reduce surgical site infection. The Cochrane Database of Systematic Reviews, Issue 1

4. Details of the impact (indicative maximum 750 words)

The research led by Prof Tanner has raised the profile of SSIs, and changed the way in which many hospitals collect SSI data across the UK, leading to reduced SSIs and improved quality of life for thousands of surgical patients.

Prof Tanner's 2008 SSI surveillance study at the University Hospitals of Leicester (UHL) NHS Acute Trust identified an SSI rate of 27% for colorectal patients with an average additional cost per patient of £10,400. Treating colorectal SSIs cost the UHL trust and the local primary care trust £900,000 in just one year. This information led the UHL trust to finance and implement a trust wide surveillance programme with six staff using the surveillance method Prof Tanner set up. This programme, which included 15,000 patients annually, was temporarily suspended in 2012 (staff shortages), but the trust has stated its commitment to resume surveillance in its 2013 strategy.

Prof Tanner then led the development and implementation of a care bundle of interventions at UHL to reduce SSIs (including the recommendations from the Cochrane reviews) which saw colorectal SSI rates fall from 27% in 2008 to 18% in 2010, a cost saving of around £350,000 for just one surgical specialty in one year. Part of the surveillance programme set up by Prof Tanner included a rapid feedback system to clinical staff of SSI rates and compliance with interventions to reduce SSIs. Through this feedback system, compliance with antibiotic prophylaxis for surgical patients increased from 60% to 95%. The SSI surveillance data from Prof Tanner's study led the local primary care trust to include SSI targets in the Commissioning Quality Initiatives (CQUIN) agreement in 2009 and these have been included each year since. This was the first trust in England to include SSIs as a CQUIN target (agreements between trusts and commissioners to improve clinical outcomes – financial penalties are associated with unmet targets).

Prof Tanner disseminated the findings from this surveillance study widely, having spoken at around 60 conferences, study days or master classes since January 2008 in over 10 countries including a lecture tour in Japan. Interest in this topic is high – Prof Tanner was an invited speaker at more than 50 of these events. Ten trusts across England have invited Prof Tanner to discuss SSI surveillance with them and staff from four trusts across England have visited UHL to observe the surveillance programme prior to implementing post discharge surveillance in their own trusts.

This engagement with clinicians has led to substantial changes in SSI surveillance practice in England. In 2008, no hospitals in England carried out active post discharge surveillance and it was not included in the national SSI surveillance programme. However, the national surveillance survey led by Prof Tanner in 2012 showed that 73/106 trusts in England do now undertake post discharge surveillance. The survey also showed that 23 trusts had followed UHL's pioneering decision to include SSIs as a CQUIN target.

Prof Tanner's 2012 SSI surveillance survey was critical of the national surveillance programme (showing the inappropriateness of using its incomplete data for benchmarking trusts) and generated considerable interest from clinicians and the media. Its publication in January 2013 was accompanied by a press release and became a news item on local and national media as well as the British Medical Journal and the Health Service Journal. The news item in the BMJ online garnered several written responses including one from the Health Protection Agency and has had 900 hits and 400 downloads to date. The Journal of Hospital Infection also published several letters in response to Tanner's article. A written response from Tanner in the Journal of Hospital Infection called upon the Health Protection Agency to engage and consult with clinicians to improve the current national surveillance programme. In July 2013, the Health Protection Agency disseminated a survey to all trusts in England to 'capture their views for future SSI surveillance'. For the first time in July 2013, SSI rates published by the Health Protection Agency were explicitly

acknowledged as comprising only inpatients and readmissions and thus were not complete.

As well as raising the profile of SSIs, Prof Tanner has led several studies, including three Cochrane reviews of effectiveness, to reduce SSIs. These have been cited in numerous guidelines worldwide. For example:

The recommendation from Prof Tanner's Cochrane review of pre-operative hair removal that clippers should be used instead of razors is included in:

- guidelines published by the Joint Commission Accreditation Healthcare Organisations (USA) (first published in 2007 and repeated annually). This guideline will apply to an estimated 20 million patients across the USA annually.
- The recommendation is also one of six interventions which form a package of care sponsored by the Centres for Medicare and Medicaid in collaboration with the American Hospitals Association, Centres for Disease Control, Institute for Healthcare Improvement and the Joint Commission (2006-2010).
- This recommendation is also stated in the UK's NICE guidelines (2008) and the Department of Health's High Impact Intervention (2011). All hospitals in England must by law comply with High Impact Interventions. This will apply to four million surgical operations in each year.
- This review is also cited in the 2011 national guidelines for surgical practice in Australia.

The recommendation from Prof Tanner's review on surgical hand hygiene stating the optimum duration of the surgical scrub is cited in the World Health Organisation's hand hygiene guidelines published in 2009, which are utilised in over one hundred countries worldwide.

The recommendation for the routine use of double gloving from Prof Tanner's review of surgical gloving is cited in guidelines published by:

- NICE (2008) – NICE guidelines are applicable to all NHS and independent trusts in the UK
- the Association for Perioperative Practice (2011)
- the American Academy of Orthopedic Surgeons (2010)
- the American Association for Surgical Technologists (2008)

The Health Protection Agency's annual report on SSIs in England (Dec 2012) stated many hospitals exhibited a decreasing trend in SSIs, 'undoubtedly' caused by the implementation of the NICE SSI guidelines and DH High Impact Interventions. The NICE SSI guidelines and the DH High Impact Interventions cite recommendations from Prof Tanner's Cochrane reviews of pre-operative hair removal and surgical gloving.

5. Sources to corroborate the impact (indicative maximum of 10 references)

1. The claims listed above about the Surgical Site Infection surveillance programme at UHL and claims that other hospitals have developed their surveillance programmes on Prof Tanner's model are verified by the written evidence provided by the Infection Prevention Surveillance Lead at UHL. Written evidence is also provided from the Infection Prevention Lead at British Pregnancy Advisory Service to verify that they also developed their surveillance programmes on Prof Tanner's model. This is available upon request.

2. Evidence for the lack of post discharge surveillance prior to 2008, and evidence of Prof Tanner's effective dissemination to increase post discharge surveillance and to improve transparency of national published SSI rates can be seen in the following documents:

- Surveillance of Surgical Site Infection in NHS Hospitals in England 2010/2011 (http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317131972352) (accessed 05/08/13)
- Tanner J, Kiernan M, Leaper D, Padley W, Norrie P, Baggott R. A benchmark too far: findings from a national survey of surgical site infection surveillance. Journal of Hospital Infection 2013 83 87-91(hard copy available on request)
- Monitoring Surgical Wounds – Patient Leaflet 2013 (http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1194947348455) (accessed 05/08/13)

3. The claims listed above about the media interest in this project can be verified through the following links:

- http://www.bmj.com/content/346/bmj.f345 (accessed 05/08/13)

- http://www.hsj.co.uk/news/acute-care/hospitals-must-tackle-surgery-infection-rate/5053748.article (accessed 05/08/13)
- Hall L, Halton K, Bailey EJ et al. Post discharge surgical site surveillance – where to from here. Journal of Hospital Infection 2013 84 268 (hard copy available on request)
- Lamagni T, Wilson J, Wloch C et al. Improving patient safety through surgical site infection surveillance. Journal of Hospital Infection 2013 84 269-270 (hard copy available on request)
- Tanner J, Kiernan M, Leaper D, Baggott R. Reliable surgical site infection surveillance with robust validation is required. Journal of Hospital Infection 2013 84 270 (hard copy available on request)

4. The claims that Tanner's work has been cited in various guidelines worldwide can be verified through the guidelines themselves. The examples listed in this case study are available as follows:

Guidelines – Cochrane review of pre-operative hair removal

- Joint Commission Accreditation Healthcare Organisations National Patient Safety Goals (from 2007- current) http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2666853/ (accessed 05/08/13)
- The recommendation is also one of six interventions which form a package of care sponsored by the Centres for Medicare and Medicaid in collaboration with the American Hospitals Association, Centres for Disease Control, Institute for Healthcare Improvement and the Joint Commission (2006-2010). Masica AL, Richter KM, Convery P et al. Linking Joint Commission inpatient core measures and National Patient Safety Goals with evidence. Baylor University Medical Center Proceedings. 2009 22 103-111 (especially page 107) (hard copy available on request)
- NICE Guidelines to reduce surgical site infection (2008 – current) http://guidance.nice.org.uk/CG74 (accessed 05/08/13)
- Department of Health, High Impact Interventions. Surgical Site Infection (2011 – current) http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/SurgicalSiteInfection/Guidelines/ (accessed 05/08/13)
- The 2011 national guidelines for surgical practice in Australia (hard copy available on request)

Guidelines – Cochrane review of surgical hand disinfection

- WHO Guidelines on Hand Hygiene in Health Care 2009 http://www.jstor.org/stable/10.1086/600379 (accessed 05/08/13)

Guidelines – Cochrane review of double gloving

- NICE Guidelines to reduce surgical site infection 2008 http://guidance.nice.org.uk/CG74 (accessed 05/08/13)
- The Association for Perioperative Practice (2011) (hard copy available on request)
- The American Academy of Orthopedic Surgeons (2010) http://www.aaos.org/about/papers/advistmt/1018.asp (accessed 05/08/13)
- The American Association for Surgical Technologists (2008) (http://www.ast.org/pdf/Standards_of_Practice/RSOP_Gowning_Gloving.pdf) (accessed 05/08/13)

5. The claims that SSIs are reducing because of DH High Impact Interventions and NICE Guidelines can be evidenced in the HPA report on the Surveillance of Surgical Site Infections in NHS hospitals in England (which can accessed via this link)

- http://www.hpa.org.uk/Publications/InfectiousDiseases/SurgicalSiteInfectionReports/1212SSIreport2011to2012data/ (accessed 05/08/13, see especially page 17).

As the synopsis of this report states: "This report is a summary of data on surgical site infections (SSIs) collected by NHS hospitals and independent sector NHS treatment centres in England participating in one of 17 surgical categories of surveillance between April 2007 and March 2012. Data presented in this report include both submissions made on a voluntary basis by participating hospitals and data submitted as part of the Department of Health's mandatory healthcare-associated infection surveillance programme."