

# Surveillance quality correlates with SSI rates in prosthetic hip/knee and colorectal surgeries: a call to action to adjust reporting of SSI rates.

A. Atkinson<sup>1</sup>, N. Troillet<sup>2,6</sup>, A. Widmer<sup>3,6</sup>, M.-C. Eisenring<sup>2,6</sup>, S. P. Kuster<sup>4,6</sup>, M. Zwahlen<sup>5</sup>, J. Marschall<sup>1,6</sup>

<sup>1</sup>Department of Infectious Diseases, Bern University Hospital, University of Bern, Bern, Switzerland, <sup>2</sup>Service of Infectious Diseases, Central Institute, Valais Hospitals, Sion, Switzerland, <sup>3</sup>Institute of Social and Preventive Medicine, University of Bern, Switzerland, <sup>4</sup>Division of Infectious Diseases and Hospital Epidemiology, University Hospital and University of Zurich, Switzerland, <sup>5</sup>Department of Infectious Diseases, University Hospital Basel, Switzerland, <sup>6</sup>Swissnoso, the National Center for Infection Control, Bern, Switzerland

## Background

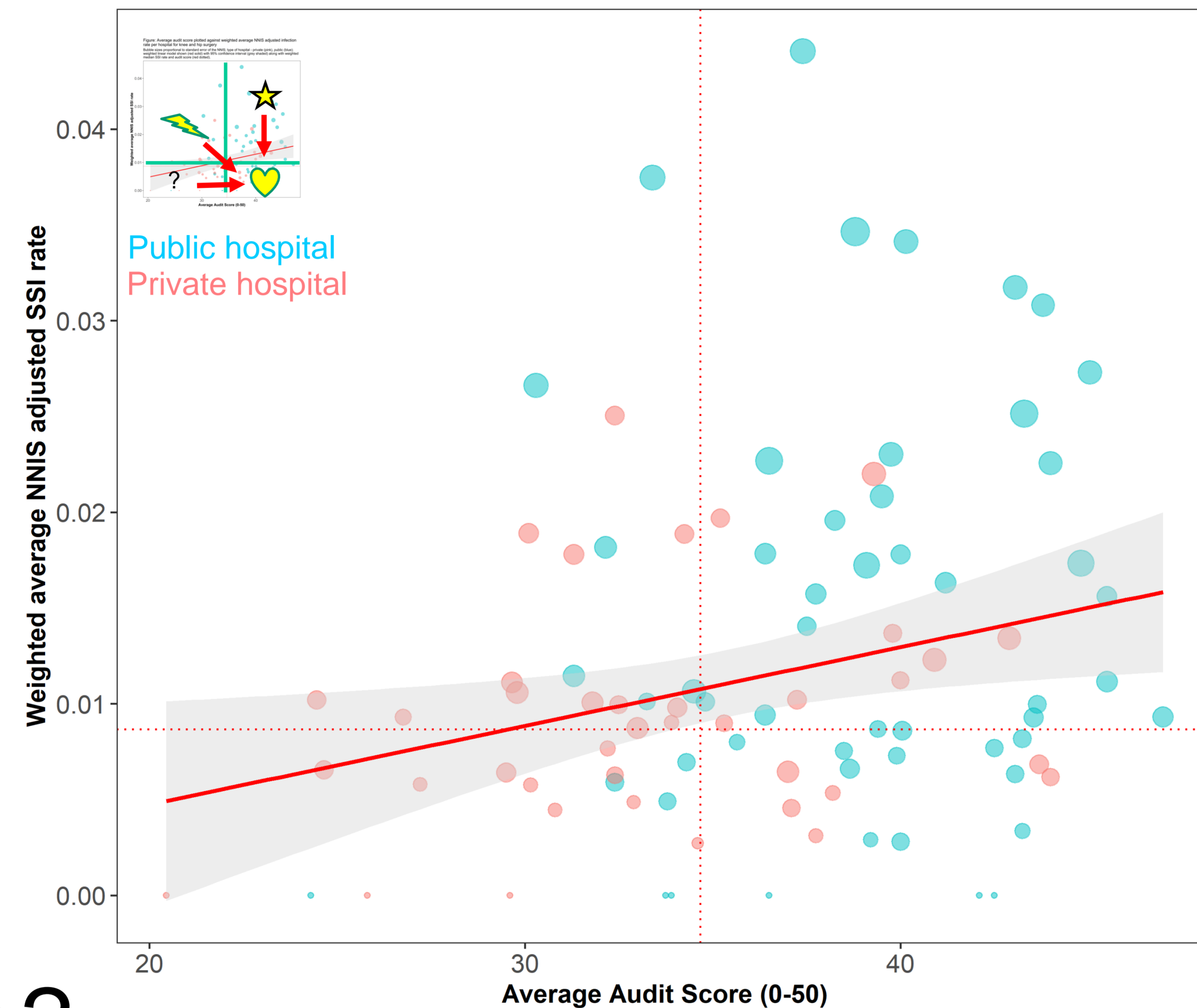
- SSI data from a large network of Swiss hospitals has routinely been collected in a nationwide SSI surveillance system since 2009.
- Surgical site infections (SSIs) are rather infrequent following knee/hip surgery but rather frequent after colorectal surgery.
- All hospitals have 2 external audits to assess the surveillance quality.
- The aim of the study was to investigate whether SSI rates are correlated with the quality of surveillance, and to contrast the situation in prosthetic versus colorectal surgery.

## Methods

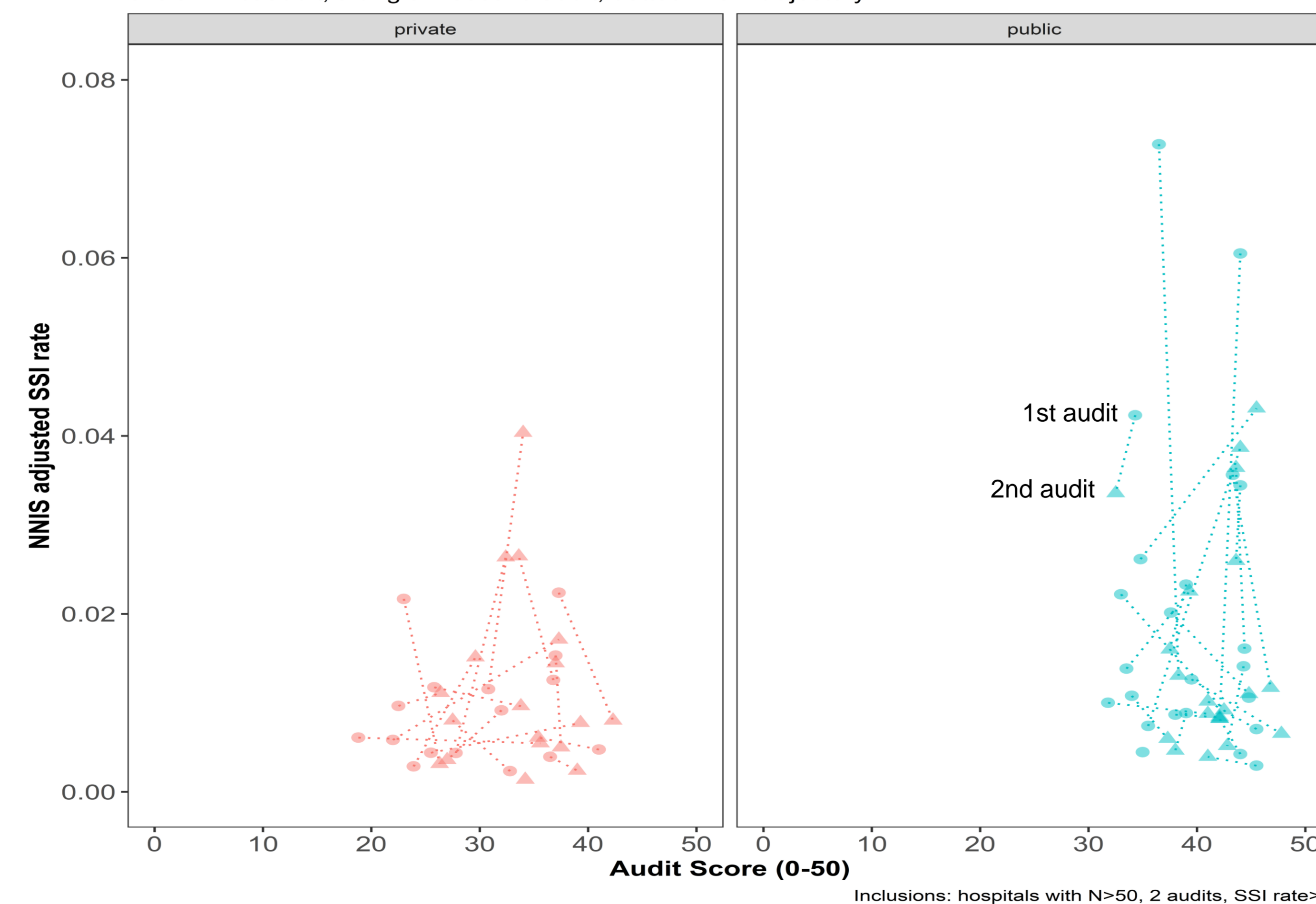
- We calculated the weighted mean NNIS adjusted infection rates in both surgery groups for the years in which audits occurred *in each hospital*.
- The 50-point score per audit is an amalgamation of quantitative and qualitative information from both structured interviews and a random selection of reviewed patient records, including (amongst others) an evaluation of completeness of medical documentation, follow-up, data quality and training history.
- We then plotted the audit quality score against the infection rate for each hospital adding a linear trend line (solid red).
- We excluded hospitals with <50 procedures in the respective audit year.
- Figure panels A1 and B1 plots the 2 audit average score against the average NNIS adjusted infection rate for the years in which the audits occurred (medians shown dotted red).
- The score and infection rate trajectory from audit 1 (circle) to audit 2 (triangle) is shown in panels A2 and B2, stratified by private (pink) and public (blue) hospitals.

## Figure: Audit score plotted against NNIS adjusted infection rate

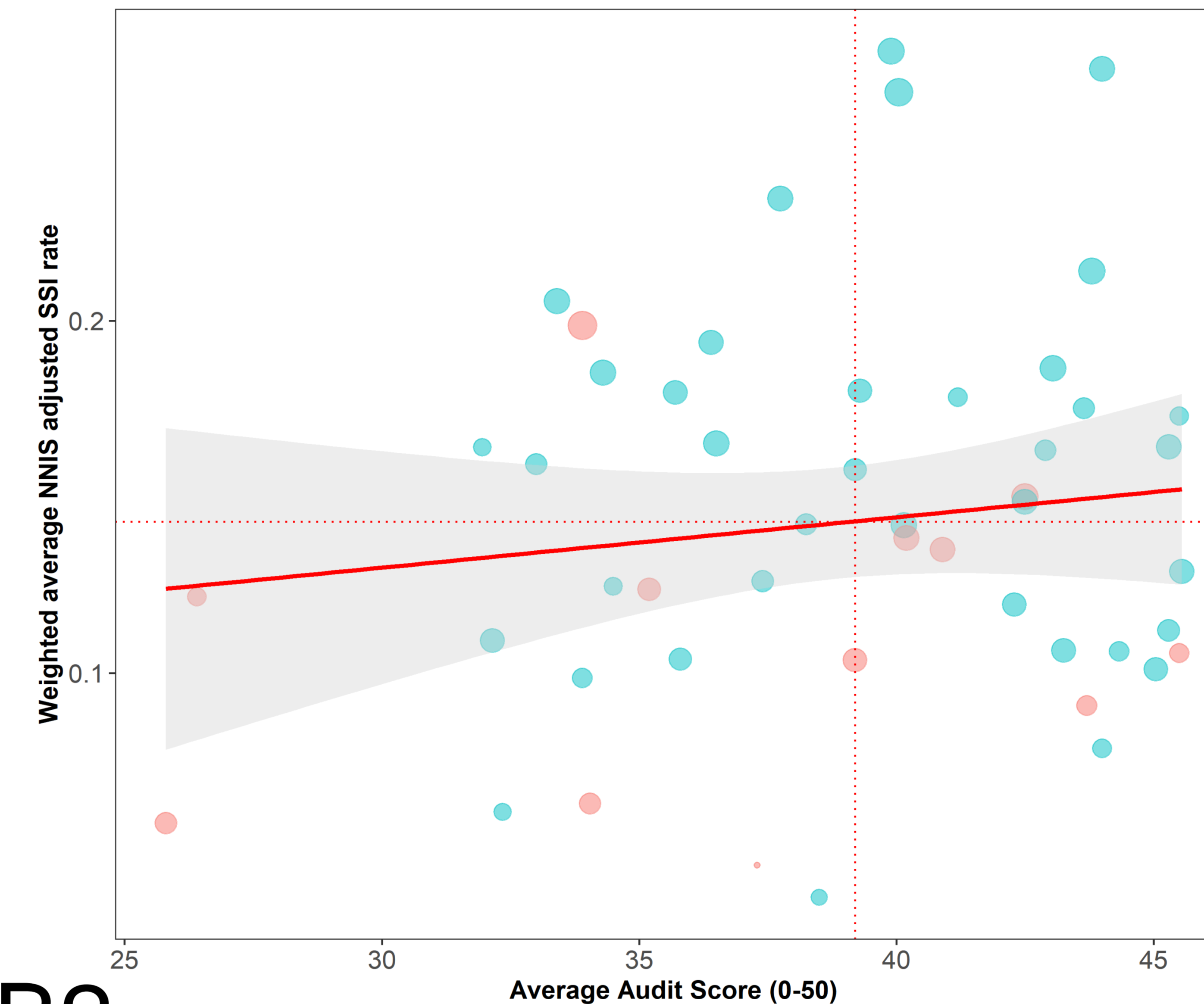
**A1** Figure: Per hospital average audit score plotted against weighted average NNIS adjusted infection rate for knee and hip surgery for those years in which audits occurred. Bubble sizes proportional to standard error of the infection rate; type of hospital - private (pink), public (blue); weighted linear model shown (red solid) with 95% confidence interval (grey shaded) along with weighted median SSI rate and audit score (red dotted).



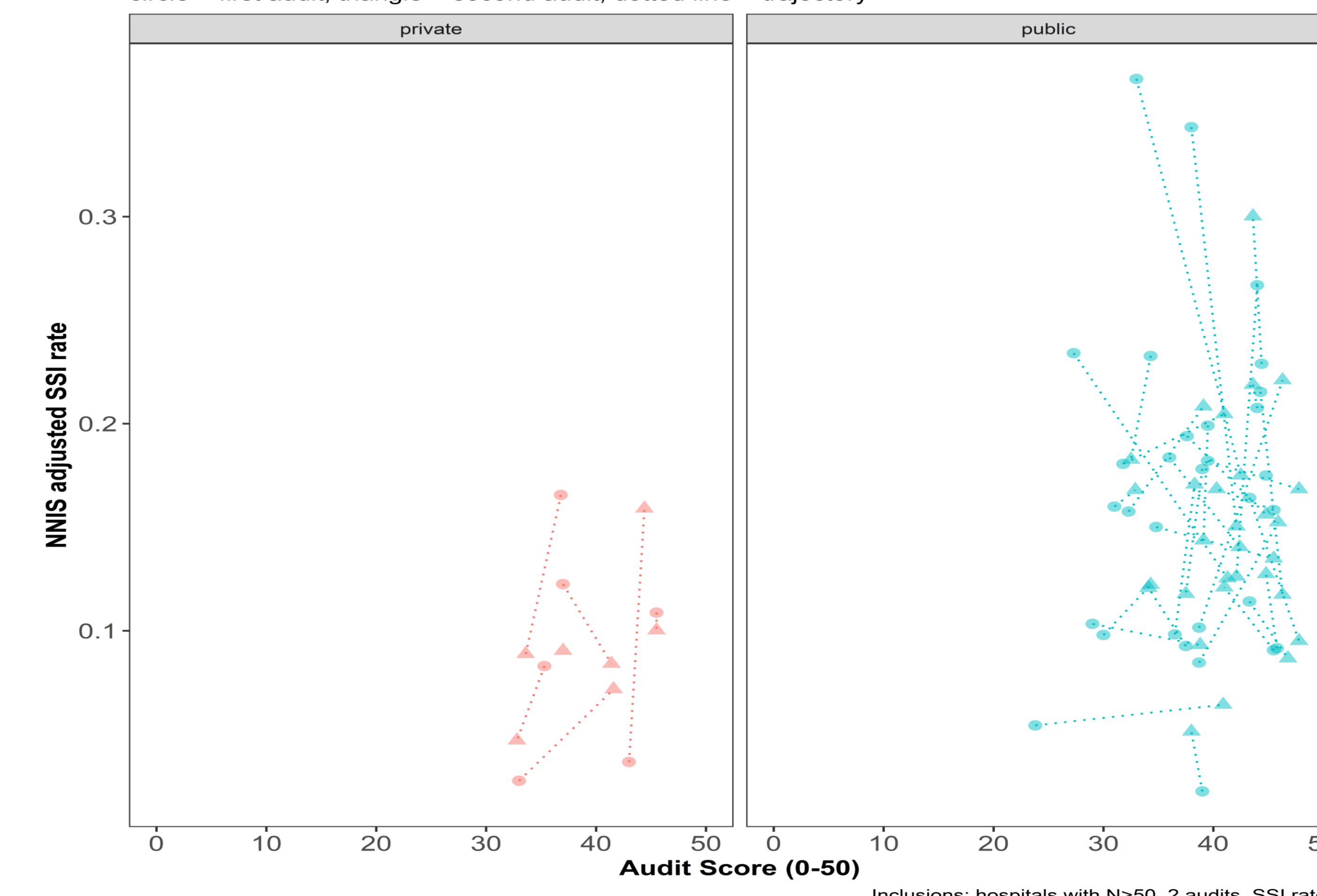
**A2** Figure: Audit score trajectory plotted against NNIS adjusted infection rate per hospital for knee and hip surgery. circle = first audit, triangle = second audit; dotted line = trajectory



**B1** Figure: Per hospital average audit score plotted against weighted average NNIS adjusted infection rate for colorectal surgery for those years in which audits occurred. Bubble sizes proportional to standard error of the infection rate; type of hospital - private (pink), public (blue); weighted linear model shown (red solid) with 95% confidence interval (grey shaded) along with weighted median SSI rate and audit score (red dotted).



**B2** Figure: Audit score trajectory plotted against NNIS adjusted infection rate per hospital for colorectal surgery. circle = first audit, triangle = second audit; dotted line = trajectory



## Results

- The analysis of knee and hip surgeries included 30'696 procedures from 92 hospitals with a median infection rate 1% (IQR [1-2%]) and median audit score 35 (IQR [32-39]).
- The analysis of colorectal surgeries included 9'589 from 49 hospitals with a median infection rate 14.3% (IQR [10.6-17.5%]) and median audit score 39 (IQR [35-43]).
- For both surgery types there is large variability in rates and scores.
- Figure A1 shows an increasing linear trend for hip and knee surgery ( $p=0.01$ ), but this is not the case for colorectal surgery ( $p=0.4$ ).
- Figures A2/B2 show that infection rate and audit score trajectories are generally improving, although this is less discernible for private hospitals (in pink).

## Conclusions

- In this national surveillance of nosocomial SSI hip and knee and colorectal infections, there was a wide range of SSI rates and surveillance quality, with discernible clustering of hospital types for knee and hip surgery.
- Hospitals with low infection rate correlated with low quality audit scores.
- The simple graphical presentation enables score development over time to presented with the clear goal that each hospital should be in the bottom right hand corner (see inlay figure A1).
- A limitation of the approach is that the quality score is unfortunately hospital, and not procedure, specific.

## Key takeaways

- Surveillance systems without routine evaluation of validity may underestimate the true incidence of SSIs.
- Audit quality should be taken into account when interpreting SSI rates, perhaps by adjusting infection rates for those hospitals with lower audit scores.