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Review

Publication of surgeon specific outcome data: A review of implementation, controversies and the potential impact on surgical training

P.D. Radford, L.F. Derbyshire, J. Shalhoub, J.E.F. Fitzgerald*,
On behalf of the Council of the Association of Surgeons in Training

Association of Surgeons in Training 35 – 43 Lincoln's Inn Fields, London, WC2A 3PE, United Kingdom

HIGHLIGHTS

- Government-mandated named surgeon outcomes have been published in England.
- Concerns surround data quality, risk adjustment, interpretation, and case selection.
- Data reflect the individual surgeon, but also the wider hospital team and resources.
- The potential impact on surgical training has largely been overlooked.
- The most appropriate outcome measures and adjustments need to be studied and refined.

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ABSTRACT

Government-mandated publication of named surgeon-specific outcome data (SSD) has recently been introduced across nine surgical speciality areas in England. This move is the first time that such national data has been released in any country, and it promises to provide a significant advancement in health service transparency. Data is derived from nine preexisting national surgical audit databases. However, eight of these were not originally designed for this purpose, and there is considerable controversy surrounding data quality, risk adjustment, patient use and interpretation, and surgeons' subsequent case selection. Concerns also surround the degree to which these results truly reflect the individual consultant, or the wider hospital team and accompanying resources. The potential impact on surgical training has largely been overlooked. This paper investigated the background to SSD publication and controversies surrounding this, the potential impact on surgical training and the response to these concerns from medical and surgical leaders. As SSD collection continues to be refined, the most appropriate outcomes measurements need to be established, and risk adjustment requires ongoing improvement and validation. Prospective evaluation of changes in surgical training should be undertaken, as any degradation of will have both short and long-term consequences for patients and surgeons alike. It is important that the literature supporting the safety of supervised trainee practice is also promoted in order to counterbalance any potential concerns that might detract from trainee operating opportunities. Finally, it is important that outcomes data is communicated to patients in the most meaningful way in order to facilitate their understanding and interpretation given the complexities of the data and analysis involved.

1. Introduction

In recent years there have been increasing calls for greater transparency and disclosure within healthcare, in order to provide patients with information on the performance of their clinicians and the hospital where they are being cared for. Given its

Abbreviations: ASiT, The Association of Surgeons in Training; EWTR, European Working Time Regulations; HQIP, Healthcare Quality Improvement Partnership; NHS, National Health Service; SSD, Surgeon Specific Outcome Data.

* Corresponding author. Association of Surgeons in Training, 35 – 43 Lincoln's Inn Fields, London, WC2A 3PE, UK. Twitter: @ASiTofficial.
E-mail address: edwardfitzgerald@doctors.org.uk (J.E.F. Fitzgerald).

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procedural and higher-risk nature, surgical outcomes have been central in this. Within the United Kingdom (UK), a significant stimulus was provided by the Kennedy Inquiry into high death rates following paediatric cardiac surgery at Bristol Royal Infirmary [1]. Here, disciplinary action was brought against two surgeons whose mortality rates were significantly higher than those of colleagues at comparable units. This moved the government to mandate the reporting of surgeon specific mortality data for all cardiothoracic surgery units in the UK. Following on from this, the Society of Cardiothoracic Surgeons of Great Britain and Ireland published the activity and mortality rates of all consultants undertaking adult cardiac surgery in the UK in 2004 [2]. Transparency within surgery was accelerated further when in 2005, the Freedom of Information Act came into force and the Guardian newspaper requested information on all the outcomes of cardiac surgeons [3].

In the years since the Kennedy Inquiry, the National Health Service (NHS) has been challenged with further scandals around patient care, particularly the failings at Mid Staffordshire Hospital. The subsequent Francis report [4] resulted in the publication of the NHS Commissioning Board's document "Everybody Counts" in 2012 [5]. This further underlined the need for greater transparency in the NHS for patients, from both staff and the groups commissioning services from the NHS. The document called for units to publish "activity, clinical quality measures and survival rates from national clinical audits for every consultant practicing" across nine specified surgical speciality areas, together with interventional cardiology. The benefits of this were cited as aiding identification of 'outliers' with higher mortality rates, improving surgical care and aiding transparency and patient decision making [6]. This work has been led by the Healthcare Quality Improvement Partnership (HQIP) under the auspices of the NHS Medical Director, Professor Sir Bruce Keogh.

The eventual publication of SSD has been controversial throughout [7–9], particularly given the risks of career damage or prosecution associated with underperforming outlier identification [10]. Proponents argue that non-public reporting does not necessarily drive quality improvement, and openly publishing this data may reduce mortality and enhance patient outcomes [11]. However, only a small number of studies have linked the publication of performance data with actual improvement in health outcomes, and low levels of data use by healthcare consumers have been reported [12,13]. Critics argue that 'gaming' occurs, with risk-averse surgeons passing difficult cases on to colleagues [14], or worse in that more complex cases will not be undertaken at all. The training of junior surgeons may also be adversely affected if surgeons seek to protect their individual outcomes [15].

Others have cautioned that surgeon specific mortality data does not accurately reflect the multi-disciplinary care patients receive before, during and after their surgery, and so unit-specific data is more appropriate [16]. Making the surgeon solely accountable may serve to accentuate stereotyped hierarchies that are counterproductive for patient safety, and subordinate the role of anaesthetists and intensive care physicians [17]. While such individual responsibility may be a strong incentive for quality improvement, this is contrasted by evidence suggesting flattened hierarchies, team responsibilities and blame-free cultures facilitate improved outcomes [18,19].

This paper reviews the background to SSD publication and the controversy surrounding this, the potential impact on surgical training and the response to these concerns from medical and surgical leaders. Looking to the future, a number of suggestions are made to facilitate communicating SSD to patients and media, and to ensure surgical training is monitored and protected to improve quality and future patient safety.

2. Implementation and controversies

Eight existing national surgical audit databases were selected to provide the initial SSD data, in addition to that already provided for cardiac surgery, giving nine surgical specialities covered in total. Outcome data from interventional cardiology was also selected, however this non-surgical specialty is not considered further in this review. Further details regarding these surgical audits are provided in Table 1. As a minimum, each speciality was required to provide surgeon-specific procedural volume and the mortality rates, in addition to national averages. This initiative currently applies only to NHS England, however it is likely this will be expanded over time given that some of these audits already cover surgeons working other the UK regions of Wales, Scotland and Northern Ireland.

An important feature of this data publication is that the national audit databases do not cover every surgical procedure performed; the data to be published has been specified for each speciality. This therefore means that surgeons not performing an included procedure will not be captured within the published data. Currently, SSD does not therefore provide a definite standard for all practicing surgeons, with just under half being absent from the published outcomes data.

Due to data protection legislation, consultant surgeons had to agree to the publication of their audit data. Fewer than 30 surgeons (less than 1%) refused due to various concerns [20]; these decisions were not supported by the Secretary of State or the Royal College of Surgeons of England [21,22] and the names of these surgeons together with the justifications for withholding their data was made publicly available online on the NHS Choice website [23]. These reasons typically related to concerns surrounding the quality of the data collected (particularly correct identification of the surgeon and attribution of cases) and the methods of risk adjustment. At the hospital level, data from one included audit database (colorectal surgery) previously suggested that higher postoperative mortality rates were seen for those not reporting data voluntarily [24]. However, from the initial data sets it was noted that none of those who withheld consent had mortality rates that were higher than expected [23].

Concern was also expressed over the hurried manner in which these figures were introduced and collated [25]. The national surgical audits harnessed to provide the outcome data were not necessarily designed for this purpose, and data submitted was not entered with this in mind. Inaccurate data entry and coding, together with difficulty in retrospectively risk adjusting, has therefore raised issues regarding validity and interpretation. This has required considerable work to address, including a review of data quality and validation, and issues have arisen over the inadequate funding and resources available to undertake and administer this.

The resulting adverse media coverage in response to the first tranche of data released, including reference to crude mortality rates and league tables, added to this controversy. Despite efforts to communicate with the media in advance in order to assist with data interpretation, public 'naming and shaming' and ranking of consultant surgeons by mortality rates resulted in dramatic and sensationalist national newspaper headlines (e.g. "The surgeons whose patients were up to 30 times likelier to die" [26]).

The demand for publication of SSD across surgical specialities also reignited the wider debate about their value and potential implications. Proponents have argued that publishing this data despite its current shortcomings serves to focus resources on responsible collection, analysis and dissemination together with resulting performance improvement [27]. However, current studies of other surgeon-specific reporting schemes suggest only half of participating surgeons comprehend data validity, accuracy or

Table 1
Speciality Surgical Society audits and included procedures.

Speciality	Audit	Included procedures	Specialist Society	Link to outcome data
Adult cardiac surgery	National Adult Cardiac Surgery Audit	• Isolated first time coronary artery bypass graft (CABG) • Isolated first time aortic valve surgery	Society for Cardiothoracic Surgery (SCTS)	http://www.scts.org/patients/
Bariatric surgery	National Bariatric Surgery Register	• Gastric band • Roux-en Y gastric bypass • Sleeve gastrectomy • Duodenal switch • Duodenal switch+sleeve • Bilio-pancreatic diversion • Revisional gastric band • Gastric balloon	British Obesity & Metabolic Surgery Society (BOMSS)	http://nbsr.e-dendrite.com/
Colorectal surgery	National Bowel Cancer Audit Program	• Major bowel resection for curative and palliative patients	The Association of Coloproctology of Great Britain and Ireland (ACPGBI)	http://www.acpgbi.org.uk/surgeon-outcomes/
Head and neck surgery	National Head and Neck Cancer Audit	Surgical resections on: • Oral cavity • Oropharynx • Hypopharynx • Larynx • Major salivary gland • Nasopharynx	British Association of Head and Neck Oncology (BAHNO)	http://www.nhs.uk/choiceintheNHS/Yourchoices/consultant-choice/Documents/Head%20and%20Neck%20Cancer%20Surgeon%20Report.pdf
Orthopaedic surgery	National Joint Registry	• Total hip replacement • Total knee replacement	British Orthopaedic Association (BOA)	http://www.njrsurgeonhospitalprofile.org.uk/
Thyroid and endocrine surgery	BAETS National Audit	• Thyroidectomy	British Association of Endocrine and Thyroid Surgeons (BAETS)	http://baets.e-dendrite.com/
Upper gastrointestinal surgery	National Oesophago-Gastric Cancer Audit	• Oesophagectomy for curative patients • Gastrectomy for curative patients	Association of Upper Gastrointestinal Surgeons (AUGIS)	http://www.augis.org/surgical-outcomes/outcomes-data.htm
Urological surgery	BAUS Cancer Registry	• Nephrectomy	British Association of Urological Surgeons (BAUS)	http://www.baus.org.uk/patients/surgical_outcomes/
Vascular surgery	UK Audit of Vascular Surgical Services & Carotid Endarterectomy	• Elective infra renal AAA repairs • Carotid endarterectomy	Vascular Society of Great Britain and Ireland (VSGBI)	http://www.vsqip.org.uk/surgeon-level-public-reporting/

Data adapted from “Greater information for patients about their surgeons”, http://www.rcseng.ac.uk/patients/the-surgical-team/surgical-outcomes.

complexity, with even fewer taking steps to validate data or improve performance [28]. Similarly, a previous study examining public release of cardiac surgery data suggested this resulted in only a modest impact on referral patterns by physicians [29]. Patient awareness or interest in these figures may also be low, with one study reporting less than 1% of patients undergoing cardiac surgery knew the correct rating of their surgeon or hospital beforehand [30]. Many assumptions surround the benefits of such public reporting, but overall little research examines the effects of public reporting on the delivery of health care [31].

Focussing outcomes on the responsible surgeon also ignores the input of the wider team involved in patient care, including anaesthetics, critical care, nursing staff and allied healthcare professionals involved. Organisational, infrastructure and wider workforce issues also play an important role, with nurse staffing and education [32–34], intensive care availability [35], cumulative team experience [36], team-working behaviours [37] and human resource management [38] all being associated with patient outcomes. Surgical complication rates have also been shown to occur at broadly similar levels across different hospital settings. Rather, differences lie in the mortality rates of those patients who experience complications. Previous research has shown that differences in rates of death among surgical patients with major complications are the primary determinant of variation in overall mortality [39]. The implication from this is that timely recognition and management of complications, many of which may be medical, is important in determining overall outcome beyond that of the surgeon's practice alone. The varying capacity to deliver this has been recognised in an outcome measure termed ‘Failure to Rescue’ (FTR) [40]. This outcome is influenced by many factors potentially outside the responsible surgeon's control, and contributes to the argument that outcome measures should be reported for the team, or hospital unit, rather than for individual surgeons.

Numerous statistical issues have also been debated in the way outcomes data is collated and presented. The Vascular Society was the first association to release outcomes data, and the publication of the raw data without risk adjustment led to inaccurate conclusions being drawn [9]. Omission or errors in risk adjustment could potentially lead to the incorrect identification of outliers. Appropriate, validated, models of risk adjustment require careful development and continuous refinement; although at the hospital level a previous analysis of large hospital registries provided similar estimates of coronary artery bypass performance both with and without the application of risk adjustment [41]. Regardless, the current data reports such mortality rates without a clear understanding of what constitutes clinically acceptable variation other than arbitrary statistical definitions of ‘outliers’.

The number of procedures performed has also come under scrutiny. Cardiac surgeons, with a focussed repertoire of specialist operations, achieve relatively high case numbers of each against which statistically valid analysis can be easier to perform. For other specialities, with much wider ranges of surgical procedures provided, individual case numbers may not reach figures high enough for meaningful conclusions to be drawn and poor performance will

not be identified. This weakness is exacerbated by the choice of mortality as an outcome, which overall remains relatively infrequent. Considerably higher numbers of procedures than are currently routinely practiced are therefore required to identify those with relatively poorer performance [16]. Where numbers are low, this adds to the argument for pooling data and reporting unit rather than individual surgeon outcomes.

3. Potential impact on surgical training

Although concerns surrounding the impact on SSD publication on surgical training have been expressed [42], there is a notable paucity of data relating to this. Against this backdrop, the current adequacy of surgical training remains a topic of debate given concerns surrounding the prioritisation of service provision over training. In particular, the introduction of the European Working Time Regulation (EWTR) has provided a substantial challenge by limiting the duty hours available in which to gain sufficient operating experience [43,44]. Many studies have indicated that surgical trainees are not receiving sufficient experience, and are failing to reach nationally identified targets [45–47]. It has been suggested that adequate training is achievable within the constraints of EWTR by focussing on the quality (rather than the quantity) of time for training. However, these opportunities have not been capitalised upon, particularly for junior surgical trainees who are often instructed to only assist or observe in theatre [45]. Addressing these matters requires support and engagement by consultant trainers, and SSD publication may potentially influence this.

The introduction of SSD could potentially have both positive and negative effects on the level of training opportunities and engagement. Positive effects may include more closely supervised operating by consultants who are additionally incentivised by the open publication of their outcome data. Negative effects may include reduced trainee autonomy in decision making and operative procedures, potentially with reduced consultant delegation compromising training opportunities.

The SSD for surgical specialities was previously submitted by clinicians for existing national clinical audits; trainee involvement in a case, and the extent of this, was not required as a data-point for entry. This has a number of negative consequences; firstly on the lead surgeon who may be falsely recorded as completing the whole operation, with no record of trainee involvement. Secondly, the individual trainee has no comparative record of their outcomes from procedures undertaken until they become a consultant. If surgeons are guarding their performance outcomes, they may reduce the training opportunities available rather than risk complications being listed under their name.

Currently, only one study has explored the UK audit databases from this training perspective, which examined the impact of cardiothoracic surgeon-specific data reporting on surgical training at a single hospital centre [15]. Outcomes for 2111 consecutive patients were examined 2-years prior and 2-years following its introduction, and a significant reduction in the overall proportion of cases performed by trainees was reported. It remains to be seen whether training ultimately recovered, and whether these findings can be extrapolated to other surgical specialities.

This study also assessed outcomes of trainees versus consultants, and showed no difference in mortality, suggesting that supervised trainees are safe surgeons in the context of appropriate case selection. Similar studies have been conducted to assess the safety of surgical trainees across a range of specialities [48–52]. These demonstrate that well supervised surgical trainees are as safe operating as their consultants. One criticism of these studies, however, is that they frequently fail to assess outcomes on an intention to treat basis – if a trainee starts an operation but quickly encounters a complication, difficult anatomy or another technical challenge the consultant may take over, and the case (along with its potential complications) will be included under the consultant's figures rather than the trainee's. Publication bias may also affect studies addressing this topic.

4. Expert opinion

The impact of SSD collection on training has received little attention in the recent public and professional debate around publication. In order to address this issue, opinions were sought from those involved in the policy behind SSD and other surgical leaders. Replies were received from Professor Ben Bridgewater (Consultant cardiac surgeon, Honorary Professor of Translational Medicine at the University of Manchester and HQIP Director of Outcomes Publication), Professor Norman Williams (President of the Royal College of Surgeons of England), Mr Ian Ritchie (President of the of the Royal College of Surgeons of Edinburgh) and Professor Sir Bruce Keogh (Consultant cardiac surgeon and Medical Director of the National Health Service in England). All consented to the publication of their responses.

Professor Bridgewater stated that, as doctors, patient safety must be our primary focus. He highlighted studies demonstrating surgical trainee outcomes that are as safe as consultants often make the intention to treat error described earlier, where trainee complications are recorded under the consultant when they are required to take over an operation. Common sense would indicate that more experienced surgeons should be safer than less experienced trainee surgeons; as such surgical training needs to be delivered with full consultant supervision. The introduction of SSD should therefore lead to more focussed and directed training with better supervision from the surgical trainer and not the more distant “in the coffee room” training that can happen now.

Professor Williams echoed the view that the increased focus on patient safety and outcomes would improve surgical training and that “consultants will wish to ensure high quality training and supervision of cases, particularly difficult ones, and that this will have a positive effect on training”. Mr Ian Ritchie stated that the “concern about the effect that this might have on surgical training is very reasonable” but “there are a number of inevitabilities which will come into play with time”. The reduction of surgical training numbers means that trainees are more likely to be allocated to dedicated surgical trainers “who have an understanding of how to supervise surgical trainees appropriately and this will translate into surgical procedures carried out safely by surgical trainees, which should only reflect well on the trainer”. Mr Ritchie added that he “would hope that good surgical trainers, who reflect well on what they do, would anticipate no change in their activities”.

Professor Sir Bruce Keogh commented that SSD affecting training “is not an option” and that including details of training cases into the dataset is one approach to help prevent a negative impact on training.

5. Future recommendations

With regards to the appropriateness of current outcomes measures, further work is required to determine whether mortality is the most appropriate outcome for measuring best practice or underperformance, and whether other more frequent outcomes could better reflect this. If a death could not have ultimately been prevented, then it is a poor marker to predict avoidable patient harm [53]. Structure (e.g. procedural volume), process (e.g. adherence to specific markers of practice) and outcomes (e.g. complication rates, unplanned readmission) may all provide appropriate data for measuring the quality of surgical care [54].

Johal et al. have developed a checklist to assist with this assessment from the viewpoint of supporting revalidation of clinical practice [55]. This considers whether the proposed indicator is valid (i.e. do differences in the indicator reflect the quality of care), whether it has sufficient statistical power (i.e. what is the chance that a true outlier will be detected), whether it is a fair outcome (e.g. how well are important case mix differences captured) and whether the technical coding of the indicator and other relevant clinical information is adequate given available procedural and diagnostic codes. Within the clinical databases themselves, similar proposals have been made to consider the data quality of the case ascertainment, data completeness and processes for validating this.

With regards to protecting and improving surgical training, it is important that some reference to the level of supervision provided for trainees is collected within the required data fields of the audits. Prospective analysis of this can then be undertaken in order to monitor variation, and this may additionally feed back into surgeon, department and hospital education quality metrics.

It is possible to combine a surgeon's desire to minimise complications with high quality training through close and appropriate supervision. Advances in surgical simulation do allow surgical trainees to safely acquire skills, however it is clear that this alone will not prepare surgeons for independent practice and problems with availability and access to this remain [56]. Supervision is effective; however junior surgeons must also learn to operate independently in preparation for consultancy. In assessing the impact of SSD, more detailed baseline data regarding the proportion of operations which are performed by trainees alone or supervised as a proportion of total operations completed is required in order to measure any future changes.

In the future not all consultants may need to be trainers; it is hoped that any surgeons who are trainers will have the training they undertake accredited and audited. Recording training cases as part of the collected dataset would allow surgical trainers both to validate the amount of training they are performing and to mitigate any concerns they may have on the potential impact of training on their SSD. Good trainees should be aware of their own outcomes whilst in training and should aim where possible to record this information for formative purposes and preparation for independent practice. Existing methods of recording operations may need to be tailored to allow thorough outcome data to be added for audit purposes.

In order for such developments to be put in place, secure lines of funding and support must also be established if outcome reporting is to be continued, or even expanded. Finally, more research is needed into the use and impact of such outcome measures by patients themselves. Given the low-levels of patient knowledge and awareness around surgeon and hospital outcomes previously reported, a greater understanding of the interpretation and use of this will help facilitate clearer communication with the wider patient population.

6. Conclusions

The publication of surgeon specific outcomes data is a historic step forward in transparency for patients and their healthcare service, although the validity of these metrics remains controversial and the ultimate impact remains unknown. Concerns also surround the degree to which these results truly reflect the individual consultant, or the wider hospital team and accompanying resources. The most appropriate outcomes measurements need to be determined, and any risk adjustment requires ongoing refinement and validation. As SSD collection is widened, a prospective evaluation of changes in training should be undertaken; to-date this has been overlooked. Any degradation of surgical training will have both short and long-term consequences for patients and surgeons alike. It is similarly important that the literature supporting the safety of supervised trainee practice is promoted in order to counterbalance any potential concerns from consultants that trainee operating may adversely impact on their published outcomes data. All stakeholders should appreciate that high quality training today ultimately translates into high quality patient care tomorrow. Finally, it is important that appropriate resources are put in place to support outcomes data analysis and reporting, and that this is communicated to patients in the most meaningful way in order to facilitate their understanding and interpretation of this complex data.

Ethical approval

Not applicable.

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Conflicts of interest

All of the authors are surgical trainees and elected members of the Council of the Association of Surgeons in Training (Registered Charity No.274841), www.asit.org.

Author contribution

PDR contributed to study conception, design, literature review, undertook the discussion with surgical leaders and drafted the paper.

LFD contributed to the study design, literature review and drafted the paper.

JS contributed to the literature review and edited the paper.

JEFF contributed to the study conception, literature review, drafted and submitted the paper, and is guarantor for the manuscript.

All authors read and approved the final manuscript.

Guarantor

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