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Effect of an Independent-Sector Treatment Centre on provision of elective orthopaedic surgery in East and North Hertfordshire

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ABSTRACT

INTRODUCTION Independent Sector Treatment Centres (ISTCs) were created to relieve pressure from Acute Hospital Trusts. In October 2011, an ISTC opened on the grounds of a hospital within the East and North Hertfordshire NHS Trust. Most elective orthopaedic procedures were transferred there. We investigated the effect on productivity of operating theatres working in the ISTC compared with those working in the Acute Hospital Trust (AHT).

METHODS A 3-month period of working at the AHT was compared with the same period 9-months later in the ISTC, which were termed 'pre-' and 'post-ISTC' opening, respectively. Data for upper limb (UL) as well as foot and ankle (F&A) surgery were collected. Differences in the number of lists and patients per list constituted usage analyses. Financial productivity was calculated from the latest Payment by Results (PbR) data. A two-tailed Mann–Whitney U-test at a confidence level of 95% was employed to compare costs between groups.

RESULTS The UL surgeon undertook 18 lists in both years with 66 patients (pre-ISTC) and 32 (post-ISTC), eliciting a reduction in productivity of 51.5%. There were 13 lists for F&A surgery pre-ISTC with 67 procedures, and 20 lists with 49 patients post-ISTC. Allowing for the difference in the number of lists, a reduction of 52.5% was noted. PbR analyses confirmed productivity of £169,695 (pre-ISTC) and £95,760 (post-ISTC) at a loss of £73,935 for the UL surgeon. F&A data revealed £97,801 (pre-ISTC) and £91,960 (post-ISTC) at a loss of £54,742 when correcting for the difference in the number of lists. There was a combined reduction in potential financial productivity of £128,677 over 3 months or £514,708 over 1 year.

DISCUSSION Implementation of the ISTC was detrimental to departmental efficiency, with <50% of the number of patients being treated and a marked reduction in financial productivity.

KEYWORDS

Independent Sector Treatment Centre – Elective Orthopaedics – Payment by Results

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In 2002, the UK government agreed to commission the opening of several Independent Sector Treatment Centres (ISTCs). These facilities were established to undertake straightforward elective or diagnostic procedures with the intention of taking pressure away from acute services.[1]

This project had several aims: (i) increasing elective capacity available to the National Health Service (NHS) to reduce waiting lists and waiting times; (ii) reducing the 'spot-purchase price' in the private sector; (iii) increasing patient choice within the NHS; (iv) encouraging best practice and innovation; (v) stimulating reform within the NHS through competition.

In October 2011, an ISTC was opened in our region to cover a limited spectrum of elective general surgery, orthopaedics and ophthalmology. The facility was built on hospital grounds but managed independently of the Acute Hospital Trust. It was agreed by the PCT that the vast majority of elective surgical work would be contracted directly to the ISTC.

In a unique arrangement, surgeons from the Acute Hospital Trust were seconded to the ISTC to undertake these procedures rather than the ISTC recruiting its own surgeons from elsewhere. In contrast, managerial staff were from the private sector.

A surgical procedure with an anticipated duration of hospital stay >5 nights (eg revision arthroplasty) was not carried out at the ISTC. Likewise, no trauma or paediatric surgery was done at the ISTC. Only fit and healthy patients of American Society of Anesthesiologists (ASA) grade 1 or 2 were operated upon. Spinal surgery was also excluded because there was no access to MRI facilities out of hours. Patients were repatriated to the acute hospital if their admission extended to the weekend. Patients who were deemed 'not appropriate' for the ISTC would be treated by the Acute Hospital Trust.

We wished to investigate the objectives that the ISTC would 'increase elective capacity' and 'encourage best

practice' by making a direct comparison of a surgeon's workload in the Acute Hospital Trust and then after the same surgeon had settled in at the ISTC. Our hypothesis was that the productivity of individual orthopaedic surgeons would be improved in this setting as compared with working in their base NHS hospital.

Methods

To compare the productivity of individual surgeons, a reference period from 1 May to 31 July inclusive was chosen. This period was examined at the Acute Hospital Trust (2011) and then compared during the same months while the same surgeon was working at the ISTC (2012). This allowed a 6-month 'bedding in' period for the ISTC as the building became operational in October 2011. Pre-ISTC data were collected from the base NHS hospital using surgeons' logbooks for these 3 months in 2011. Then, data from the same period in 2012 were collected when using the centre ('post-ISTC'). Pre-ISTC data were collected using the Clinical Information and Patient Tracking System (Delian Systems, Chelmsford, UK) and ISTC period from the PROXIMA® Patient Administration System (System C, Warwick, UK).

Only data from the Consultants for upper limb (UL) as well as foot and ankle (F&A) surgery were reviewed because most of such these patients were expected to be transferred to the ISTC given the high proportion of day-case and short-stay procedures. In the Acute Hospital Trust, each Consultant undertook separate elective and trauma lists with no crossover of the two lists. This enabled direct comparison of elective procedures pre- and post-ISTC because no trauma surgery was carried out on the elective list at either site.

If a patient was unsuitable for the ISTC on account of anticipated duration of hospital stay or ASA grade,[2] then he/she was placed on an 'additional elective list' at the AHT and excluded from analyses. These 'high risk' lists occurred every six weeks and were performed in lieu of a list at the ISTC.

All elective lists at the AHT were vacated by the two surgeons in 2012 once the ISTC was operational, but they continued to undertake trauma surgery. The vacated lists were given over to another speciality and the Day Surgery Unit was closed and converted into clinical space.

For usage analyses, a 'list' was defined as a half-day operating session. There was no allowance for an over-run in the ISTC. Close inspection of AHT data confirmed no over-runs were scheduled during this time period. More detailed analyses (eg exact duration of operating per list) were not captured in this study. Simple comparison of the absolute number of lists and patients per list was carried out for this analysis. The absolute number of lists was a reflection of a consultants' timetabled use of the ISTC, but the number of patients per list gave an indication of the efficiency of the operating theatre.

The analyses of financial productivity were based on Payment by Results (PbR) data for 2012–2013[3] because this was the time period under scrutiny. PbR was introduced into the NHS in England and Wales in 2005.[4] Tariffs are derived nationally from cost data supplied by AHTs and vary according to elective or emergency admissions, comorbidities, and age. They are revised each year and include allowance for specialty service 'top-ups', and detail the market-forces factor for AHTs.

The reimbursement figure received by an AHT for a particular procedure within the NHS is constant, and was set as the benchmark to allow comparison between the ISTC and AHT. In reality, private-sector organisations have been shown to increase the cost of service provision (spot-purchase price), particularly in the context of reducing NHS waiting lists.[1] For simplicity, we ascribed a fixed reimbursement value to each procedure regardless of where it was undertaken. Details of the financial agreement between the AHT and ISCT were not available to us. Furthermore, our calculation was meant to be a numerical guide and not to be taken as an absolute value.

International Classification of Diseases (ICD)-10 codes were combined with Operating Procedure Codes (OPCS) to generate the Healthcare Resource Group (HRG) for each procedure. The HRG places procedures thought to be of similar type and magnitude into the same cost. This grouping was done using HRG Case-mix Grouper software,[5] which is freely available and used in our PCT to calculate reimbursement costs. The term 'case-mix' was taken directly from this process and is a reflection of the spread and prevalence of HRGs. Examples included the frequency of complex procedures, such as an arthroscopic rotator cuff repair (HB61C: major shoulder procedure), or less complex arthroscopic procedures, such as subacromial decompression (HB62C: intermediate shoulder procedure).

The HRG was used to determine the PbR figure for each procedure. The only assumptions made for PbR data were that each procedure was carried out in a patient aged >18 years in the absence of complications or comorbidity so that it could be applicable to procedures done at the ISTC.

Data were handled using Excel® (Microsoft, Redmond, WA, USA). Statistical analyses were carried out using Prism v6 (GraphPad, La Jolla, CA, USA). A D'Agostino–Pearson Normality test confirmed that financial data were not Normally distributed. Therefore, a non-parametric two-tailed Mann–Whitney U-test (Wilcoxon rank-sum test) at a confidence level of 95% ($p<0.05$) was used to compare financial data pre- and post-ISTC. p values are quoted to two decimal points and financial data are rounded up to the nearest whole number in Sterling.

Results

Usage analyses

The UL surgeon carried out 18 lists pre- and post-introduction of the ISTC. In 2011, 66 patients were treated (mean, 3.7 patients per list) (Table 1) but in 2012 only 32 patients were treated (mean, 1.8 patients per list) (Table 2). With regard to the total number of patients treated, this equated to a relative difference of 48.5% while working at the ISTC. The highest volume of work in both periods was

Table 1 Data from the upper-limb consultant operating in the PCTH pre-ISTC (2011)

Procedure	Details	Total	HRG code	PbR tariff (£)	Total value (£)
Arthroscopic cuff repair		13	HB61C	5,153	66,989
Other Arthroscopic Procedure	Subacromial decompression/ stabilisation/ACJ excision	17	HB62C	2,415	41,055
Arthroplasty	Shoulder (5)/elbow (1)	6	HB61C	5,153 (shoulder), 5068 (elbow)	30,833
Excision	Ganglion/biopsy/ bursa	5	JC07Z	1,326	6,630
Decompression of the carpal tunnel		17	HB55C	948	16,116
MUA + injection	Shoulder	2	HB63Z	1,401	2,802
Removal of metalwork	Forearm	3	HB99Z	331	993
Other	GT ORIF/trigger finger/elbow injection (creatine kinase)	3	HA63Z (shoulder) HB56C (finger) HB56C (injection)	1,726, 1,726, 825	4,277
				TOTAL	**169,695**
				MEAN	**2,569**
				SD	**1,754**

HRG = healthcare resource group; PbR = payment by results; ACJ = acromioclavicular joint; MUA = manipulation under anaesthesia; GT ORIF = greater tuberosity open reduction internal fixation.

arthroscopic surgery (including subacromial decompression and repair of rotator cuff). The greatest difference was with decompression of the carpal tunnel (17 vs 3) but this alone did not account for the large difference in number of surgical cases. The case-mix was similar in both periods but numbers decreased across all types of surgery for work done after introduction of the ISTC.

For F&A surgery, pre-ISTC there were 13 lists with 67 patients (mean, 5.2 patients per list) (Table 3). Post-ISTC there were 20 lists with 49 patients (mean, 2.5 patients per list (Table 4). To assess the number of patients for a similar amount of operating time, it was necessary to multiply pre-ISTC numbers by 1.5. Therefore, the adjusted volume of operating in 2011 was 103, suggesting a similar reduction in previously achieved levels of number of patients being treated (47.5%). The case-mix between the two periods was comparable, but the overall volume of procedures was less.

Table 2 Data from the upper-limb consultant operating in the ISTC (2012)

Procedure	Details	Total	HRG code	PbR tariff (£)	Total value (£)
Arthroscopic cuff repair		6	HB61C	5,153	30,918
Other arthroscopic procedures	Subacromial decompression/Biceps tenodesis/stabilisation/ACJ excision	11	HB62C	2,415	26,565
Arthroplasty	Shoulder (3)/elbow (1)	4	HB61C	5,153 (shoulder), 5068 (elbow)	20,527
Nerve decompression	Carpal tunnel (1)/ulnar (2)	3	HB55C	948	2,844
Removal of metalwork		2	HB99Z	331	662
Revision ORIF elbow		3	HA71C	3,465	10,395
Other	Lipoma/arthrolysis elbow/tennis elbow	3	HB73Z	1,283	3,849
				TOTAL	**95,760**
				MEAN	**2,990**
				SD	**1,663**

HRG = healthcare resource group; PbR = payment by results; ACJ = acromioclavicular joint; MUA = manipulation under anaesthesia; GT ORIF = greater tuberosity open reduction internal fixation.

Table 3 Data from foot & ankle consultant operating in the PCTH pre-ISTC (2011)

Procedure	Details	Total	HRG code	PbR tariff (£)	Total value (£)
Arthroplasty	Ankle (3)/first MTPJ (1)	4	HB31Z	5,004	20,016
Arthroscopy	Ankle (13)/knee (2)	15	HB33E, HB24C	1,611, 1159	23,261
Arthrodesis	Ankle (2)	2	HB32A	2,909	5,818
First MT/ MTPJ	Chevron/scarf/cheilectomy (1)	7	HB33E (osteotomy), HB34E (cheilectomy)	1,611, 1,372	11038
Lesser toes	Tenotomy (8)/lengthening (1)/ terminalisation (1)	10	HB33E (tenotomy), HB34E (terminalisation)	1,611, 1,372	15,871
Excision	IGTN (2)/spur/ganglion	8	JC16Z (IGTN)/HB34E/HB35C	767,1372, 942	3,848
Injection	Joint/bursa/plantar fascia	18	HB35C	942	16,956
Removal of metalwork	Clavicle hook plate, diastasis screws	3	HB99Z	331	993
				TOTAL	**97,801**
				MEAN	**1,504**
				SD	**989**

HRG = healthcare resource group; PbR = payment by results; MT = metatarsal; MTPJ = metatarsal phalangeal joint; IGTN = ingrowing toe nail

Financial analyses

The financial value of operating by the UL surgeon was £169,695 pre-ISTC and £95,760 post-ISTC, totaling a deficit in productivity of £73,935 over the 3-month period. For the same period, the financial value of operating for the F&A lists equated to £97,801 and £91,960, respectively. Correcting for the fact that 1.5-times more lists were undertaken during the post-ISTC period, this equated to a loss of £54,742. This scenario led to a combined loss of £128,677 over 3 months, or £514,708 extrapolated over 1 year, for these two surgeons.

Financial data were analysed in greater detail to determine the mean and standard deviation (SD) in reimbursement values for all procedures in a given time period. This calculation provided an indication of the difference in caseload because it combined individual costs for all procedures undertaken in that period (eg pre-ISTC) and could be used to determine the mean value and spread of data. The mean value of an UL case was higher than that of a F&A case (Fig 1). The range in cost of the procedures carried out before and after ISTC opening were very similar:

Table 4 Data for the foot & ankle consultant operating in the ISTC (2012)

Procedure	Details	Total	HRG code	PbR tariff (£)	Total value (£)
Arthroplasty	Ankle (2)/first MTPJ (1)	3	HB31Z	5,004	15,012
Arthroscopy	Ankle (9), knee (1)	10	HB33E/HB24C	1,611, 1159	15,658
Arthrodesis	Ankle (1)/tarsus (4)	5	HB32A	2,909	14,545
1st MT / MTPJ	Chevron/scarf (5)/fusion (1)/ bunionectomy (2)	8	HB33E (osteotomy) HB34E (fusion) HB35C (bunionectomy)	1,611, 1,372, 942	11,311
Lesser toes	Tenotomy (3)/lengthening/ osteotomy (7)	10	HB33E (tenotomy/lengthening), HB32A (osteotomy)	1,611, 2,909	25,196
Excision	Haglund (2)/osteophyte/nodule	4	HB35C, HB34E (osteophyte)	942, 1,372	4,198
Injection	Plantar fascia/paratenon/MTP	4	HB35C	942	3,768
Removal of metalwork	Screw (2), tightrope, tibial nail	4	HB99Z	331	1,324
Other	CTD	1	HB55C	948	948
				TOTAL	**91,960**
				MEAN	**1,778**
				SD	**1,087**

MT = metatarsal; MTPJ = metatarsal phalangeal joint

the SD and mean cost of the procedures overall were close in value for both periods.

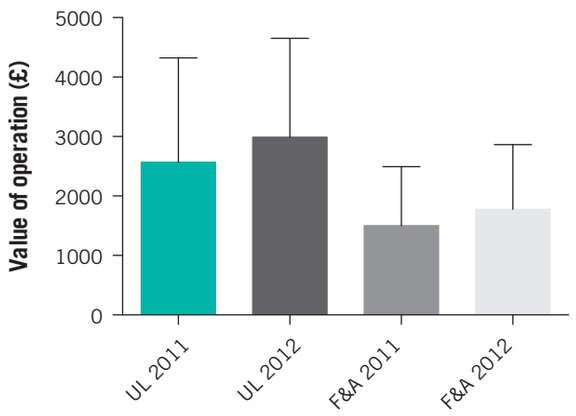
This data confirmed that the case-mix was closely comparable for each of the surgeons for the two periods. The Mann–Whitney U-test demonstrated non-significant differences between years for UL (p=0.21) and F&A (p=0.30).

Discussion

The present study demonstrated a marked reduction in productivity in the operating theatre with ISTC introduction even though the operative case-mix was similar according to HRG distribution. Fewer than half the numbers of patients were treated per list at the ISTC, resulting in a theoretical loss of more than £500,000 of financial productivity over 1 year. The ISTC was not paid by the same PbR method, so this calculation is a 'surrogate' indicator of the potential financial loss, and cannot be taken to be an exact figure of lost earnings. Furthermore, East & North Hertfordshire NHS Trust did not lose money during the time patients were being treated at the ISTC.

The same surgeon and scrub-staff were employed in both facilities. Hence, we can assume that the reduction in productivity did not arise from operative time but from other inefficiencies. Unfortunately, data for individual operative times were not readily available to confirm this assumption, but the two surgeons felt that this parameter was not significantly different between the two establishments. Instead they reported several deficiencies in the patient-care pathway in the ISTC that might have accounted for these findings.

All patient admissions were staggered throughout a list, resulting in disruptions as they were processed individually.



No significant difference in distribution of reimbursement values was observed between the two years: p=0.21 and p=0.30 for upper-limb and foot & ankle, respectively.

Figure 1 Box plot illustrating mean and standard deviation of values of procedures carried out by each surgeon in each year

Also, there was inflexibility in terms of re-ordering a list or making use of time if a procedure took less time than expected. Operating theatres lacked separate anaesthetic rooms, which delayed sending for the next patient until the operating theatre was cleaned completely from the previous patient, rather than permitting anaesthetic preparation of the next patient in parallel to cleaning of the operating theatre.

These issues were not encountered in the AHT because all patients were admitted to the Surgical Admissions Lounge on the morning of surgery. The surgical team could rearrange the order of the list with more flexibility at the preoperative team briefing on the morning of surgery. Also, there were not the same problems with the layout of each operating theatre: each operating theatre had a separate anaesthetic room that enabled the next patient to be sent for in a timely manner.

The ISTC used different information-technology software from the AHT for storing patient records, patient processing, and maintenance of clinical records. Thus, inefficiency and cancellations were common due to incomplete or missing clinical records. From a managerial viewpoint, booked theatre lists were noticeably smaller than would be compared to working in the AHT. This shortfall can be explained (noticeable smaller than when working in the AHT) by the agreement of 'take or pay' that formed part of the original framework of the ISTC. This is a financial guarantee whereby the ISTC is assured of a certain level of income irrespective of how many procedures are carried out within it for the NHS.[1]

The financial implications of this agreement have been demonstrated in a study which reported on the results from the first year of operation of an ISTC in Scotland.[6] The authors commented that the annual contract was based on the number of referrals made to the ISTC and not from the treatments carried out. The requisite number of referrals was managed during the time period but only 32% of these patients underwent a surgical intervention. The authors extrapolated the data and suggested that if the same were to occur if ISCTs were rolled-out in England, £927 million would have been spent on patients who did not go on to ultimately receive treatment. In the present study, the exact terms of the contractual agreement between the AHT and ISTC were not freely available, so we could not assess the absolute cost to the NHS of treatment of each patient.

Reduced surgical workload affects the quality of service provision and limits exposure and training opportunities for junior surgeons. It has been recognised that ISTCs provide weaker learning environments,[7] and this was true in the present study: trainees working under the ISTC framework were involved in the treatment of fewer than half the number of patients as their AHT counterparts. This reduction in logbook numbers limited training opportunities at the ISTC greatly. It has also been shown that ISTCs do not permit the same co-operation across organisational boundaries as that observed in AHTs.[7]

It has been suggested that the ISTC structure is advantageous because it allows for streamlining of services in a

dedicated environment in which staff benefit from familiarity with processes. It has been postulated that this proposed 'efficiency through repetition' system is the main strength of ISTCs. However, the shortcomings of ISTCs have been well documented.[6–8] Bannister *et al* compared the outcomes for total replacement of the hip and knee carried out in a local AHT compared with two regional ISTCs.[8] They reported considerable variation in outcome, with a marked increase in the prevalence of reoperation and wound complications, as well as a trend towards a higher prevalence of hospital readmission for arthroplasty, carried out at ISTCs.

The findings from the present study enable an informed opinion with regard the stated aims of ISTCs. Further information is also taken from a comprehensive report on ISTCs from the House of Commons (HoC).[8]

With regard to increasing elective capacity available to the NHS to reduce waiting lists and waiting times, evidence from the HoC Health Committee Report[1] stated that ISTCs provided only a modest increase in capacity. This report detailed that, as of December 2005, ISTCs had carried out 44,000 elective surgical procedures and 9,000 diagnostic procedures, with phase-I centres expected to carry out a mean of 170,000 Finished Consultant Episodes (FCEs) each year over 5 years. This figure is in contrast with the NHS as a whole, which carries out ≈5.6 million elective FCEs each year. In the case of our PCT, there was no discernible increase in capacity because so many of the elective procedures ceased and were transferred from the AHT.

Next, we looked at the stated aim of reduction of the spot purchase price in the private sector. Historically, the NHS had paid providers in the independent sector a premium of 40–100% over reference costs for services.[1] Introduction of ISTCs was a success in this regard because it elicited a downward trend in spot prices, with an estimated 50% reduction in these operation fees. However, these costs remain considerably higher than the reimbursement paid to hospitals via PbR.

Increasing patient choice within the NHS is linked to increasing elective capacity available to the NHS to reduce waiting lists and waiting times. It would appear that ISTCs do offer patients the opportunity to receive treatment quicker than if they were to rely solely on the NHS. In general, ISTCs have been viewed as providing greater choice with regard to location of treatment, though this was not the case in the present study because treatments were carried out on the main hospital campus. Also, there was an absence of robust clinical-quality information, so patient choices were not informed choices.

In terms of encouraging best practice and innovation, the HoC Health Committee Report[1] concluded that ISTCs have, in many cases, illustrated good practice and introduced innovative methods. However, as detailed previously, there is mounting evidence of the shortcomings of ISTCs. Also, it is recognised that good practice and innovation are widespread within the NHS too.

Stimulating reform within the NHS through competition could have provided the biggest impact of ISTCs on the NHS. Unfortunately, this information has not been captured and much of the evidence is anecdotal. For example, waiting times have shortened since introduction of ISTCs in 2003 but it is not clear how much of this effect is directly from their presence or a product of increased NHS spending, and focus on waiting-list targets. We have no evidence of reform or change from the introduction of an ISTC in our area.

The main limitations of our study were its reliance on data collected: (i) from only two surgeons; (ii) over only a limited period. However, because the same surgeons were involved, then differences in productivity of operating theatres were not because of differences in surgical practice but due to differences in management practices. Also, as stated above, inclusion of data for hip and spinal surgery would have detracted from the aim of the study. In addition, clinical coding is a complex process and fraught with error, so inaccuracies invariably occur. The assumptions made in the calculations ignore the fact that the ISTC did not carry out procedures on: (i) children; (ii) patients with ASA grade >2: (iii) patients undergoing revision surgery or spinal surgery. These assumptions, however, would be expected to skew the results in favour of ISTC productivity because 'cherry-picking' straightforward elective procedures in healthy patients should lead to higher throughput of patients on a list. This is in contrast to the AHT, whereby potentially more complex surgeries in less fit patients (ASA >2) would be expected to have a negative effect on productivity. A further limitation was use of a single reimbursement figure for the ISTC and AHT. We chose to use PbR data as a direct comparison but the NHS has paid independent-sector organisations 40–100% over the reference costs.[1] Therefore, our use of PbR data may be an underestimation given that the ISTC is likely to have charged more for the service it provided (though this information was not available to us).

The financial calculation was used as a means of reflecting the inefficiency of working within the ISTC system and should not be taken to be an exact figure. The AHT was reimbursed by the PbR method but the ISTC was reimbursed via a unique contract with the PCT. Therefore, the calculation was a surrogate, as detailed above.

Implementation of the ISTC was detrimental, with <50% of the number of patients being treated resulting in considerable potential financial losses. Therefore, we reject our hypothesis: the ISTC neither improved elective capacity nor encouraged best practice. In late 2013, the contract with the ISTC was terminated prematurely and the facility was handed over to the East and North Hertfordshire NHS Trust.

Conclusion

It is uncertain what impact the passing of the Health and Social Care Act in March 2012[9] will have on surgical services. New Clinical Commissioning Groups will be entrusted to seek out and employ those it regards as best equipped to provide such expertise. We hope our experience of working under an ISTC system has highlighted some potential shortcomings, and that it provides a salutary lesson to the commissioning of elective surgical services.

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