The benefits of a dedicated Day Surgery Unit

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Abstract

Introduction: Patients undergoing day case operations in our trust are managed via one of two pathways:

- Admission, surgical procedure, recovery and discharge all in dedicated Day Surgery Unit (DSU)
- Admission, surgical procedure and first stage recovery via main inpatient theatres (MT), then transfer to DSU for second stage recovery and discharge.

We aimed to establish the difference in time taken for patients to undergo the same operation via each of the two pathways.

Methods: Three routine elective operations were monitored: laparoscopic cholecystectomy (LC), laparoscopic hysterectomy (LH), and open repair of inguinal hernia (IH).

The entire patient journey was observed. The time that each patient spent at each stage, and any delaying factors, were noted.

18 patient journeys were monitored in total, 3 of each procedure (LC, LH and IH) through both DSU and MT pathways.

Results: The median time taken for the majority of steps in the pathway was shorter in the patients on the DSU pathway.

Median time taken from send to arrival in secondary recovery (hr:min): DSU 02:46. MT 03:32. Difference 00:46

Conclusions: Managing patients in a dedicated DSU results in a shorter surgical pathway for the patient. This is beneficial for the patient and has associated financial savings for the trust. The increased turnover should enable more patients to be managed on an individual list.

Introduction

Torbay Hospital is one of the top performers nationally in terms of day surgery rates, variety of day case procedures and clinical outcomes. It currently ranks in the top quartile nationally for trust level day case rates based on British Association of Day Surgery benchmarking data1.

The dedicated Day Surgery Unit (DSU) manages the majority of day case work and follows national recommendations for day surgery 2. This pathway enables patients to undertake their entire day surgery pathway (pre-operative assessment, preparation, surgical admission and discharge) within the same unit, cared for by a team of day surgery professionals.

The trust performs approximately 17,000 day case procedures per annum. Approximately 60% of these cases are managed via the dedicated DSU. The remaining 40% of day cases are managed via main theatre (MT) pathway, due to lack of a capacity or lack of clean air facilities in the DSU.

Day of surgery pathways:

DSU pathway:

Patients present to the DSU upon arrival in the hospital, whereby they are 'checked in' for surgery. Upon being 'sent' for, patients walk to theatre (a distance of only a few meters), where the procedure is undertaken. Patients are then transferred to primary recovery. Upon meeting the discharge criteria to exit primary recovery, patients progress to secondary recovery. Patients are discharged home from secondary recovery.

The DSU is an integrated self-contained unit, located on one level. Each step in the process requires a distance of mere metres to be travelled.

Main theatre pathway:

Patients present to the main inpatient surgical pre-operative ward, where they are 'checked in for surgery'. Upon 'sending', patients are checked out of the ward, and escorted down two stories via a lift, to main theatres. On completion of the procedure, patients are transferred to main theatre recovery. When patients meet the discharge criteria to exit main recovery, a porter is summoned, and the patients are transferred down three stories via a lift, through the Emergency Department, to the DSU secondary recovery. Patients are again discharged home from secondary recovery.

The aim of this piece work is to evaluate the efficiency of patient flow through our dedicated DSU, compared to undergoing day case procedures via main theatres.

Methods

Three different day case procedures that are performed in both main theatres and the DSU were selected; laparoscopic cholecystectomy, inguinal hernia repair, and laparoscopic hysterectomy. 3 patients undergoing each procedure on each pathway were randomly selected to be followed (n=18, 9vs9). Patients were allocated to the two pathways as normal, by the theatre booking team who were unaware of the project. An auditor followed each patient throughout the entirety of their patient journey, from presentation on the pre-operative ward, to arrival at second stage recovery. During each

case, contemporaneous timings were recorded at specific intervals in the patient journey. Qualitative information on delays was documented.

The patient journey was defined as time from 'send' to time of arrival in second stage recovery.

Time from arrival on the preoperative ward to send would vary depending on position on list and was therefore omitted.

The recorded data was analysed using a data spreadsheet programme and statistical analysis was performed via analysis software R and SPSS.

Results

Table 1. Duration of patient journey.

	DSU	MT	Difference	DSU	MT	Difference
Procedure	Total for 3 cases (Hr:min)	Total for 3 cases (Hr:min)	(Hr:min)	Median time (Hr:min)	Median time (Hr:min)	(Hr:min)
LC	06:37	11:02	04:25	01:53	03:38	01:45
LH	09:12	10:48	01:36	03:09	03:41	00:32
IHR	08:08	09:40	01:32	02:46	03:27	00:41
All cases	23:57	31:30	07:33	02:46	03:32	00:46

- Defined as time from send to arrival in secondary recovery.
- A Mann-Whitney U test was performed, comparing total duration of patient journey across all three case types between DSU and MT (n=9 v 9):
- p = 0.002 with median (interquartile range [range]) times(mins) of:
- DSU 166 (146-177 [107-205])
- MT 212 (207-221 [162-242])

If we take the Bayesian view of probability, these results would generate the belief that MT total time is 50 minutes longer than DSU time with a 95% credible interval of 18-90 minutes.

Table 2. Interval timings.

TIME BETWEEN:	DSU MEDIAN & RANGE (Hr:min)	MT MEDIAN & RANGE (Hr:min)	DIFFERENCE (Hr:min)
Send and arrival in anaesthetic room (AR)	00:06 (00:02-00:09)	00:17 (00:15 – 00:32)	00:11
Arrival in AR and transfer to theatres	00:16 (00:10-00:25)	00:20 (00:13 – 00:43)	00:04
Arrival in theatre and knife to skin(KTS)	00:16 (00:10 – 00:23)	00:20 (00:15-00:23)	00:04
Surgical time	01:06 (00:44 – 01:34)	01:15 (00:36-01:53)	00:09
Surgical close and exit theatre	00:09 (00:05-00:16)	00:09 (00:06-00:19)	00:00
Primary recovery	00:50 (00:13-01:16)	00:49 (00:24-01:18)	-00:01
Primary exit and arrival in secondary recovery	00:01 (00:00-00:02)	00:06 (00:04-00:15)	00:05

Table 3. Theatre time (arrival in anaesthetic room to exit operating theatre) vs non-theatre time (Patient journey minus theatre time) for all cases (n=9:9).

	Total DSU (mins)	Total MT (mins)	Difference (mins)	p Value
Duration of patient journey	1437	1890	453	0.002*
Theatre time	970	1168	198	0.085
Non-Theatre time	467	722	255	0.017*

A Mann-Whitney U test was used to compare theatre and non-theatre times across both pathways.

Efficiency Gains (Based on estimated running costs)
Despite not achieving a significant difference (p=0.085) between pathways, the following has been included to demonstrate the organisational benefits conferred by saving theatre time.

Theatre time running costs for 9 cases:

- DSU = £12 per minute
- 970 x 12 = £11640
- Main Theatres = £15 per minute
- 1168 x 15 = £17520
- Theatre time efficiency gain = £5880 across 9 patients
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Non-theatre time saved per patient

- Difference in non-theatre time/number of patients on DSU pathway
- 255/9 = 28 mins of staff contact time per patient.

Table 4. Subjective reasons for time differences in various stages of the patient journey.

Stage of journey	Reason for difference
Send to arrival in AR	Greater distance to travel and more indirect sending system in MT pathway
Arrival in AR and transfer into theatre	Send occurs immediately after morning brief in DSU
Enter OT and KTS	Patients remain on DSU trolley from AR, through surgery and to recovery. Less time spent transferring. Culture difference in DSU – surgeons are often scrubbed and ready during time out.
Surgical close and exit OT	DSU trolleys and culture of signing out during final closure in DSU. If patients have not received neuromuscular blockade, are breathing and have a straightforward airway, recovery staff are able to extubate in DSU primary recovery but not in MT primary.
Primary Recovery	Must wait for a porter in main theatre primary recovery
Primary exit and arrival in secondary recovery	Time taken to transfer patient through hospital from MT primary to DSU secondary.

Discussion

The data obtained demonstrates a faster total transit time through a dedicated DSU when compared with a day surgery pathway through main theatres (p=0.002). It also suggests a faster time through most elements of the patient journey. This confers an efficiency gain which can be described in terms of duration, finances, cases per list or staff contact time.

There are many organisational, cultural and logistical factors underlying the difference in performance. Table 5 highlights some of the reasons identified during direct observation but overarching key differences include:

Ergonomics of clinical area

The design and layout of the day surgery department allows theatre staff to move patient's short distances by foot or on trolleys without requiring a porter. All clinical staff are working close by so recovery and pre op staff can attend the morning safety brief. Any issues or hold ups can be clearly communicated face to face and resolved more efficiently. When sending for a patient, the ODP physically takes a send form and walks it down the corridor to locate the HCA who then collects the patient. This is in contrast to a semi-automated system where a send form is printed in the MT surgical admissions unit and the patient is brought down when the form is collected by an available staff member. Post-operatively, rather than a seven-minute transfer through the hospital from MT primary to DSU secondary recovery, it is a matter of pushing a patient through double doors from DSU primary to secondary. In reality this gives recovery staff more confidence to transfer to secondary recovery earlier in day surgery.

Day surgery trolleys

In the DSU, patients walk from the waiting area to anaesthetic room and sit on the day surgery trolley. They will then stay on this trolley for their anaesthetic, surgery and recovery. Add-ons in theatre such as arm boards, lithotomy stirrups and shoulder supports along with trolley functionality enable patient positioning to cover all current day case procedures. This saves on transfer time and helps reduce intra operative heat loss and post-operative nausea and vomiting associated with repeated rolling and patient transfer.

Culture

Torbay hospital's day surgery unit is staffed with specific day surgery nurses, ODPs, HCAs and administrative staff. It has ownership of its preoperative assessment and post-operative follow up pathways and has a strong culture of continuous audit and quality improvement whilst pushing the boundaries of current day surgery practice with procedures such as hip, knee, shoulder replacements and nephrectomies. This has led to a group of workers who are experts in helping patients navigate each part of the pathway and who are motivated to keep admission rates low.

Admission Documentation

Patients on the MT pathway experience a different admission process to those on the DSU pathway. Our inpatient admissions unit have a culture of repeating patient observations on admission (blood pressure, heart rate and oxygen saturations). The policy in DSU is that these only need to be checked if a problem was identified at the preoperative assessment clinic. In addition, patients on the MT pathway require duplication of paperwork as more detailed "inpatient pathway" paperwork is expected for patients attending the MT complex. The combination of these results in significant increase in the

time taken for the nurse based admission process and often delays the surgical and anaesthetic staff who have to wait for this to be completed prior to being able to visit the patient pre-operatively.

Whilst the number of patients and type of procedure reviewed is a limitation of this project, it reflects the resource intensive nature of contemporaneous data collection; over 55 hours on data collection alone. Expanding on the numbers and procedure type may highlight true differences in system performance (e.g. shorter theatre times) which are distorted by potential outliers in this data set.

As this is an observational study rather than interventional, it is open to a range of confounding factors, some of which are highlighted below.

The patients in each group were not matched for comorbidity or surgical complexity and there was no retrospective analysis or post hoc correction. The patients were allocated by theatre booking staff who do not take patient characteristics into account during the booking process. Underlying differences in complexity of cases may have contributed to lengthen the theatre time of either DSU or MT pathway patients which in turn would have impacted on the observed difference. Other confounding factors may include, type of anaesthetic, experience of staff, teaching and training. It has previously been demonstrated that the same operation, using the same surgeon and anaesthetist takes less theatre time in Torbay's dedicated DSU when compared to MT3. It is therefore plausible that the above factors may have masked a significant difference in theatre time.

Improving the efficiency of the MT pathway may be achieved by applying the learning from observation of the equivalent pathway in a dedicated DSU. A proportion of unproductive time is due to the distance between admissions, theatres and secondary recovery. This may be difficult to overcome. A main theatre discharge lounge has previously been trialed but resulted in increased admission rates. It may be possible to increase the use of day surgery trolleys in the MT pathway and work on specific aspects of staff culture to reduce theatre time. Expanding the day surgery unit to take a larger proportion of day surgery procedures may well increase capacity and efficiency and would be a possible long term plan.

Conclusion

National guidelines recommend day surgery cases should occur in a dedicated day surgery unit and our experience supports this.

Patients undergoing the same procedure via a dedicated Day Surgery Unit experience a shorter pathway and require less 'staff time,' potentially resulting in a reduced financial burden to the trust.

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