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ORIGINAL ARTICLE

Implementation of day of surgery admission for rectal cancer surgery in Ireland following a national centralisation programme

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Abstract

Background Centralisation of rectal cancer surgery has altered the delivery of colorectal cancer care in Ireland. This has resulted in an increased demand for elective surgical beds in designated centres.

Aim This study aimed to assess if day of surgery admission (DOSA), in conjunction with implementation of a coordinated enhanced recovery pathway can reduce length of stay following elective rectal cancer resection.

Methods This is a retrospective review from a single institution. Our prospectively maintained Dendrite® Database was interrogated. Three time points were analysed across a 7-year period (2011, 2012, 2016). The first predates the introduction of a dedicated DOSA programme, the next was directly thereafter, and the final was 5-years post-implementation. These dates coincide with the centralisation of rectal cancer surgery to this centre. Outcomes included unadjusted length of stay and rates of DOSA pre-and post-implementation of the programme.

Results The introduction of a DOSA pathway resulted in a fivefold increase in day of surgery admissions and a related 3-day reduction in average length of stay within a single year of implementation. This further improved in 2016, showing an almost 83% increase (15.90–98.50%) in day of surgery admission and a reduction in average length of stay from 16.4 to 12.4 days when compared to 2011.

Conclusions Despite an increase in caseload of 54%, an estimated 272 bed days were saved. This demonstrated that DOSA is sustainable and highly effective in tackling the increased inpatient bed demands associated with the growing requirement for elective surgery.

Keywords Centralisation · Day of surgery admission · Ireland · Length of stay · Rectal cancer

Introduction

The centralisation of rectal cancer treatment was proposed in Ireland in 2006 as a strategy to improve quality of care and patient outcomes [1, 2]. Drivers for change included below-average five-year survival for patients diagnosed with colorectal cancer between 2000 and 2002 and specific concerns regarding the standard of care of rectal cancer, principally the variable implementation of surgical best practice and inadequate access to multidisciplinary decision-making for patients [3]. In 2007, operations for rectal cancer were performed in 49 Irish hospitals [4]. The National Cancer Control Programme (NCCP) proposed centralising services to eight dedicated cancer centres [5]. Centralisation had previously been demonstrated to be successful in breast cancer; however, such programme was expected to pose a greater challenge for rectal cancer. On average, rectal cancer surgery requires more theatre time, carries a higher risk of morbidity and mortality and results in a longer hospital stay than breast cancer surgery [6, 7]. Increased demand in designated centres was expected to put significant stress on their ability to provide adequate surgical bed numbers.

In anticipation of increased demand on our institution, a university teaching hospital and designated rectal cancer centre, a multidisciplinary colorectal taskforce was established. This team completed a detailed review of the local care pathway for patients with rectal cancer. International best practice

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in colorectal surgery was reviewed and evaluated. Features of enhanced recovery after surgery programmes (ERAS) [8] and a variety of admissions systems were assessed as means of streamlining inpatient management [9]. Day of surgery admission (DOSA) was identified as a strategy to reduce hospital stay but its feasibility and safety in major complex surgery was unproven in Ireland. This study reports on the introduction of a DOSA programme into routine practice in 2012 and its ongoing use in 2016.

Methods

A pilot day of surgery admissions (DOSA) programme including elements of an enhanced recovery pathway was launched in 2011 and implemented as the primary route of admission in 2012. This programme was designed by a multidisciplinary colorectal surgery services group convened to systemically review the care pathway for patients with rectal cancer.

A dedicated enhanced recovery clinical nurse specialist developed the documentation and provided the outpatient clinical assessment required to facilitate the new pathway. Initially, all patients were pre-assessed in a consultant led anaesthetics clinics prior to admission for surgery. As experience increased, only complex cases were referred on for consultant anaesthetist pre-assessment.

Home administration of low molecular weight heparin thromboprophylaxis, carbohydrate pre-loading, reduced fasting times, and outpatient-based stoma education was introduced as strategies to facilitate day of surgery admission.

Data used for analysis of outcomes was retrospectively extracted from an institution, dedicated colorectal cancer database prospectively maintained by specialist data collection managers. Data points collected included patient demographics, tumour location, tumour type, time to surgery, distance travelled to hospital, date of admission, date of surgery, length of stay, operation performed, and neoadjuvant treatment.

Primary endpoints were average length of stay and day of surgery admission. Three time points encompassing key stages of implementation of DOSA were selected for analysis. These years include the pilot year, the first full-scale year, and 5 years following introduction; 2011, 2012, and 2016 respectively. Fisher's exact test was used to compare DOSA rates between the groups. An unpaired *t* test was used to compare the mean LOS between patient groups.

Results

Elective rectal cancer resection was performed on 44 patients in 2011; this increased to 67 and 68 patients in 2012 and 2016 respectively. Male predominance was seen across all 3 years, ranging from 66 to 79%. Average patient age decreased over time, with a reduction from 69.5 (42–85) in 2011 to 61.5 (34–84) in 2016. The majority of patients were treated by anterior resection (69%) or APR (21%) with or without VRAM flap reconstruction (9% and 12%, respectively). Transanal or local resections were performed in 6% and proctocolectomy in 4%. The majority of patients received pre-operative chemoradiotherapy (long course 74%, short course 3%).

In 2010, no patients were admitted for rectal cancer resection on the day of surgery. During the pilot year, 2011, 7 of 44 patients (15.9%) were admitted on the morning of surgery; this was compared to 62 of 67 patients (92.5%) in 2012, and 67 of 68 patients (98.5%) in 2016. There was a statistically significant difference in DOSA rates between 2011 and 2016 ($p < 0.0001$). Mean LOS in 2011 was 16.4 days. In 2012, this was reduced 13.4 days and further again to 12.4 days in 2016 (Fig. 1). There was a statistically significant difference in the mean LOS between 2011 and 2016 ($p = 0.016$). Despite a relative increase in caseload of 54% (44 vs 68 patients) between 2011 and 2016, only 122 more bed days were used. An estimated 272 bed days were saved in 2016 due to this reduction in length of stay. This effect was also seen in 2011, though to a lesser extent, with an estimated saving of 200 bed days (Fig. 2).

Discussion

Centralisation has produced a significant increase in rectal cancer operative caseload for designated centres [10], and demand for high-dependency surgical beds in such centres is liable to increase as emphasis on centralisation continues [11]. Reports to date offer reassuring data on early post-operative outcomes following this implementation of a centralised approach [2, 10]. Rectal cancer care is resource intensive, requiring access to screening, endoscopy, radiology, histology, multidisciplinary team discussion, adjuvant and neoadjuvant treatment, complex major surgery, and surveillance. Adequate access to these resources is essential to the delivery of effective evidence-driven care [12]. Maintaining a high-quality service despite increased demand poses a dilemma for healthcare teams. Access to hospital is a rate-limiting step in the process. Reducing unnecessary bed days is one strategy to increase system throughput, without the need for expansion of infrastructure.

While DOSA is previously reported in colorectal cancer surgery, most series combine colon and rectal resections with relatively smaller numbers of the latter [13]. In our experience, achieving high DOSA rates for rectal cancer resection is more challenging than in colon cancer. Early quality improvement reports in this area specifically excluded tumours below the peritoneal reflection from

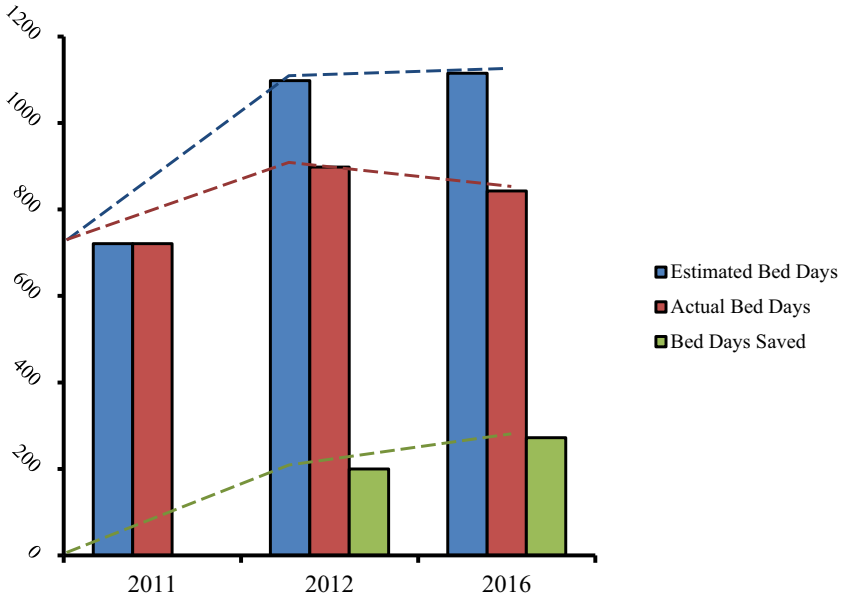

Fig. 1 Total patient numbers, day of surgery admissions (DOSA), and length of stay across 2011, 2012, and 2016. DOSA rates reached 98.5% in 2016, 5 years from initial implementation. Length of stay reductions seen in 2012 were sustained and improved upon in 2016

changes in pre- and post-operative care [14]. The reasons for this include higher stoma rates, which necessitate patient education and site marking. Furthermore, rectal resection is associated with prolonged LOS when compared to other types of colorectal resections even with an enhanced recovery programme [15, 16]. Likewise, most series report average LOS for colon and rectal resections combined, but small series reporting exclusively on rectal resection indicate LOS of between 8 and 12.5 days can be achieved [17, 18].

Initially reservations were expressed by staff about the capacity of our institution to safely reduce LOS while coping with a substantial increase in caseload. The introduction of DOSA was made a focus. Consultation elicited several specific barriers to change including timely access to outpatient tests and anaesthetic pre-assessment clinics; the absence of a dedicated day of a surgery admissions area; inadequate time on the morning of surgery to consent patients and provide stoma marking; and no staffing infrastructure outside the hospital to deliver necessary pre-operative therapy such as thromboprophylaxis, reservations about potential delays in theatre start times, variation in perceived acceptable minimal fasting times among different staff members, and inadequate pre-operative work-ups leading to more cancellations on the planned day of surgery.

In 2011, carefully selected medically fit patients were offered DOSA. No special day of surgery facilities were

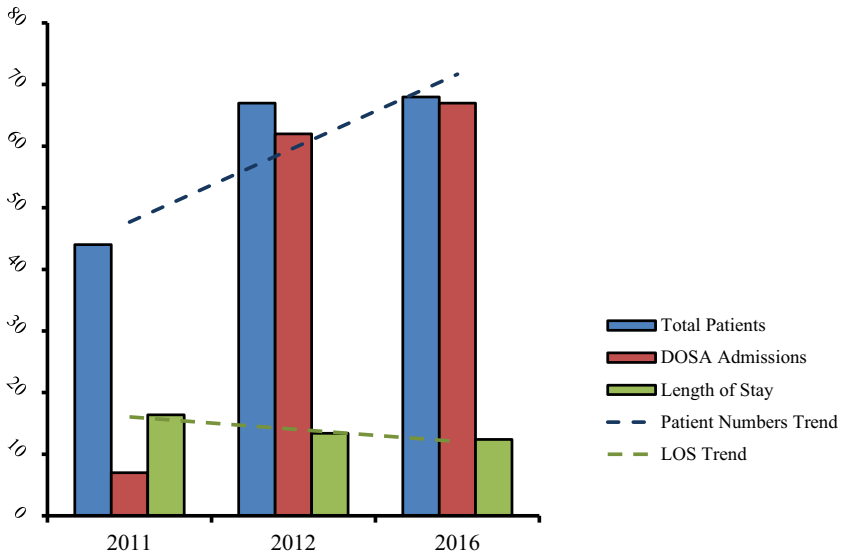

Fig. 2 Estimated bed days based on 2011 LOS were projected for 2012 and 2016. Actual bed days were found to be substantially lower than predicted based on LOS rates prior to full scale DOSA programme implementation. Bed days saved continued to increase with continued use of DOSA protocol

available; patients were admitted through a general surgery ward on the morning of surgery. At the same time, a part-time colorectal enhanced recovery clinical nurse specialist (CNS) role was introduced. This facilitated nurse led outpatient pre-assessment and education of all rectal cancer patients. Every patient was pre-assessed by the CNS, a standard pre-operative work-up performed and results were discussed with a consultant anaesthetist in advance admission. As the programme developed, agreed criteria for referral to consultant anaesthetist pre-assessment clinic were established.

Strategies to manage patients with medical comorbidities initially deemed unsuitable for DOSA were developed on a case by case basis. This required communication with other disciplines, including anaesthesia, cardiology, and endocrinology. Further modifications to the pathway included introduction of home-administered low molecular weight heparin thromboprophylaxis, carbohydrate preloading, reduced fasting times, and outpatient-based stoma pre-education. Throughout the study period, the colorectal surgery services group met approximately every 6 weeks to report progress and troubleshoot. By the end of 2011, the pathway was felt to be sufficiently robust that it could be implemented as standard practice. Centralisation of rectal cancer surgery commenced on the following year, in April 2012. The resulting referrals from other hospitals were managed using the same protocol as patients referred from primary practice.

The 92.5% DOSA rate achieved in our 2012 cohort was expected to reduce average LOS in our series by 1 day per patient but a reduction in average LOS of 3 days was observed; this improved again in 2016, with a further day gained. Our mean LOS of 12.4 days leaves room for further improvement but supports suggestions that part of the reduction in length of stay attributable to enhanced recovery programmes may be explained by better organisation of care [14].

Asides from improvements in primary endpoints such as LOS, development of a standardised DOSA/ERAS protocol has other significant advantages, such as amenability to audit as continued adaptions are made. Furthermore, common goal setting resulted in increased communication and improved cohesion across the multidisciplinary team [19].

Conclusion

The findings outlined in this study show that careful implementation of a dedicated day of surgery admissions programme is an effective means by which length of stay can be meaningfully reduced in the setting of rectal surgery, providing a means of addressing the increased demand for surgical beds resulting from centralisation. Protocols and procedures had to be established to facilitate the changes in practice required to run such programme. Commitment from the multidisciplinary team, and the motivation and desire to implement change were necessary to ensure its success. Going forward, analysis of readmission rates and community-based strategies aimed to tackle the major causes such as stoma issues and wound complications will be vital for the continued success of DOSA.

Author contributions Study concept and design: D.A. McNamara
Study materials: I. Stephens
Data collection: I. Stephens and C. Murphy
Data analysis: I. Stephens and I.S Reynolds
Manuscript preparation: All authors
Manuscript review: All authors

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

References

1. Department of Health and Children (2006) A strategy for cancer control in Ireland. National Cancer Forum
2. Burke JP, Coffey JC, Boyle E, Keane F, McNamara DA (2013) Early outcomes for rectal cancer surgery in the republic of Ireland following a national centralization program. Ann Surg Oncol 20(11):3414–3421
3. Boyle E, Timmons A, Al-Akash M, Kennedy AM, O'Grady H, Hill AD et al (2011) The management of rectal cancer in Ireland in 2007–room for improvement? Surgeon 9(4):179–186
4. Comber H, Sharp L, Timmons A, Keane FB (2012) Quality of rectal cancer surgery and its relationship to surgeon and hospital caseload: a population-based study. Color Dis 14(10):e692–e700
5. National Cancer Control Programme (2014) Report on the implementation of "a strategy for cancer control in Ireland 2006". Health Service Executive
6. Bao H, Yang F, Su S, Wang X, Zhang M, Xiao Y, Jiang H, Wang J, Liu M (2016) Evaluating the effect of clinical care pathways on quality of cancer care: analysis of breast, colon and rectal cancer pathways. J Cancer Res Clin Oncol 142(5):1079–1089
7. Sun SX, Leung AN, Dillon PW, Hollenbeak CS (2015) Length of stay and readmissions in mastectomy patients. Breast J 21(5):526–532
8. Spanjersberg W, Reurings J, Keus F, van Laarhoven C (2011) Fast track surgery versus conventional recovery strategies for colorectal surgery. Cochrane Database Syst Rev Art. No.: CD007635
9. Teeuwen PH, Bleichrodt RP, de Jong PJ, van Goor H, Bremers AJ (2011) Enhanced recovery after surgery versus conventional peri-operative care in rectal surgery. Dis Colon Rectum 54(7):833–839
10. Stephens I, Stuart C, Stephens R, McCormick P, Larkin J, Mehigan B (2017) Trends in surgical mortality following colorectal resection between 2002 and 2012: a single-centre, retrospective analysis. Ir Med J 110(6):578
11. Department of Health (2017) National cancer strategy 2017-2026. National cancer control programme
12. Uña E, López-Lara F (2010) Pilot study of a clinical pathway implementation in rectal cancer. Clin Med Insights Oncol 4:111–115
13. Rothwell LA, Bokey EL, Keshava A, Chapuis PH, Dent OF (2006) Outcomes after admission on the day of elective resection for colorectal cancer. ANZ J Surg 76(1–2):14–19
14. Maessen J, Dejong CH, Hausel J, Nygren J, Lassen K, Andersen J et al (2007) A protocol is not enough to implement an enhanced

recovery programme for colorectal resection. Br J Surg 94(2):224–231
15. Hendry PO, Hausel J, Nygren J, Lassen K, Dejong CH, Ljungqvist O et al (2009) Determinants of outcome after colorectal resection within an enhanced recovery programme. Br J Surg 96(2):197–205
16. Gash KJ, Greenslade GL, Dixon AR (2012) Enhanced recovery after laparoscopic colorectal resection with primary anastomosis: accelerated discharge is safe and does not give rise to increased readmission rates. Color Dis 14(10):1287–1290
17. Byrne BE, Branagan G, Chave HS (2013) Unselected rectal cancer patients undergoing low anterior resection with defunctioning ileostomy can be safely managed within an Enhanced Recovery Programme. Tech Coloproctol 17(1):73–78
18. Hardt J, Schwarzbach M, Hasenberg T, Post S, Kienle P, Ronellenfitsch U (2013) The effect of a clinical pathway for enhanced recovery of rectal resections on perioperative quality of care. Int J Color Dis 28(7):1019–1026
19. Sehgal R, Hill A, Deasy J, McNamara DA, Cahill RA (2012) Fast-track for the modern colorectal department. World J Surg 36(10): 2473–2480