

Time trends in colectomy rates for ulcerate colitis in England – mixed methods brings mixed results

Observational studies of time trends in surgical rates for ulcerative colitis (UC) may provide insights into the impact of quality improvement initiatives or new treatments. Worley and colleagues applied various approaches to evaluating such trends using administrative data for English Hospitals.(1) They studied cumulative incidence of colectomy following a first emergency admission for UC between 2003 and 2017 (n=37,981 patients) and also estimated population-based annual incidence rates of colectomy by extracting all admissions for colectomy that were coded with a diagnosis of UC (n=17,580) over that same period.

For the emergency cohort they present evidence of a declining risk of early surgery for patients treated in more recent time periods, consistent with our previous report of a 3% year-on-year reduction in adjusted odds of surgery during index emergency admission between 2005 and 2013.(2) A novel aspect of their study is an attempt to determine whether surgery is merely being delayed in the acute phase but not avoided in the longer term. The authors present a series of analyses from which they conclude that *“mixed analyses suggest that the rate of colectomy has decreased but this reduction does not persist beyond one year”*. There are a number of other interesting themes explored in this paper but the conclusion about a lack of improvement in long term colectomy-free survival after first emergency admission deserves some scrutiny.

The authors start with Kaplan Meier (KM) analysis (**Fig. 2**) which shows that in comparison to patients admitted during 2003-2007 or 2008-2012, those admitted during 2013-2016 had a significantly lower cumulative probability of colectomy. The curves diverge and remain parallel (no convergence) beyond three years after index admission. Readers may interpret this as a sustained reduction in cumulative probability of surgery, assuming similar case mix across periods. Subsequent Cox proportional hazards models (**Table 4**) show that patients admitted in the 2013-2016 period had a significantly lower case mix-adjusted hazard rate for surgery. However, when the results of an Interrupted Time Series Analysis (ITSA) are presented, the findings are significant for short but not for longer term surgical end-points.

ITSA is gaining popularity for evaluating system-wide interventions.(3) Here, the authors postulated that 2008/9 was a pivotal year for UC care (publication of IBD standards and approval of infliximab) and so predicted that a change in surgical trends would occur after the ‘intervention’ year. As predicted, no decreasing trend is detected during 2003-2008 but a significant trend change occurs post-intervention (2009-2016) with a 4% year-on-year reduction for 30- and 90-day end-points. However, the analysis fails to show a statistically significant result for the one and three year end-points, leading to the authors’ conclusion.

Whilst ITSA may be well-suited to examining short term outcomes after interventions there may be some question as to the reliability of this approach for examining surgery at three years post index admission. Firstly, some patients in 2003-2008 period will have received subsequent care in the 2009-2016 period during a three year follow-up interval (e.g. readmission), so the pre- and post-intervention groups are not cleanly separated when considering longer term care outcome. Secondly, patients were followed until April 2017,

reducing the number of patients in the 2009-2016 cohort with complete follow-up and perhaps affecting statistical power? It would be interesting to know how the authors reconcile the ITSA with the KM and Cox models, as the mixed methods appear to provide some mixed messages with respect to long term risk of surgery.

1. Worley G, Almoudaris A, Bassett P et al. Colectomy rates for ulcerative colitis in England 2003-2016. *Aliment Pharmacol Ther.* 2020 Dec 2;
2. Shawihdi M, Dodd S, Kallis C et al. Nationwide improvement in outcomes of emergency admission for ulcerative colitis in England, 2005-2013. *Aliment Pharmacol Ther.* 2019 Jul;50(2):176–92
3. Ewusie JE, Soobiah C, Blondal E et al. Methods, Applications and Challenges in the Analysis of Interrupted Time Series Data: A Scoping Review. *J Multidiscip Healthc.* 2020;13:411–23.