

Hospital Stay and Return to Full Activity Following Laparoscopic Colorectal Surgery

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ABSTRACT

Background: The short-term benefits of laparoscopic surgery are well established, particularly within an enhanced recovery program. Early return to activity is to be expected but has not been quantified. The aim of this study was to measure the hospital stay and return to full activity following laparoscopic colorectal surgery and compare this with laparoscopic cholecystectomy and laparoscopic inguinal hernia repair.

Methods: All totally laparoscopic gallbladder, inguinal hernia, and colorectal operations performed between January 2003 and October 2006 were included. Outcomes were collected from a prospective database and case notes. Post discharge information was collected by telephone interview. A comparison was made by creating 4 groups: laparoscopic cholecystectomy, laparoscopic inguinal hernia repair (Transabdominal PrePeritoneal [TAPP]), laparoscopic colorectal nonresectional, and resectional surgery.

Results: The median hospital stay following laparoscopic colorectal resection was 7 days, while in the cholecystectomy and hernia group it was 1 day. The median return to full activity after discharge from the hospital was 4, 5, 3, and 7 days in the laparoscopic cholecystectomy, inguinal hernia repair, nonresection, and colorectal resection groups, respectively.

Conclusions: Following laparoscopic colorectal surgery, patients can be expected to return to their usual activities within a week after discharge from the hospital and less than 2 weeks from surgery.

Key Words: Laparoscopy, Colorectal, Hospital stay, Recovery.

INTRODUCTION

The short-term benefits of laparoscopic surgery in reducing hospital stay and postoperative pain are well established¹⁻⁴ particularly within an enhanced recovery program as recommended and described by Kehlet.⁵⁻⁷ A quicker recovery and an earlier return to normal activity is to be expected but has not been widely quantified. Laparoscopic trials to date, including the CLASSIC, COLOR, and COST studies, have reported on the safety and feasibility of laparoscopic colorectal surgery compared with open surgery, its complications, and in-hospital recovery.⁸⁻¹⁰ All have included laparoscopic-assisted operations rather than totally laparoscopic surgery. Only one trial¹¹ reports on recovery following discharge. This review was performed to measure the hospital stay and return to full activity following totally laparoscopic colorectal surgery. Patients undergoing laparoscopic cholecystectomy, laparoscopic inguinal hernia repair, laparoscopic nonresectional surgery, and national data were used as comparison groups.

METHODS

All laparoscopic gallbladder, inguinal hernia, and colorectal operations performed by one surgeon (M.C.P.) in a District General Hospital between January 2003 and October 2006 were included.

Data including the length of hospital stay were collected prospectively from case notes into a spreadsheet (Microsoft Excel). Patients were later contacted by telephone to assess their time to return to full activity by direct questioning. Return to full activity was defined as the time taken for the patient to achieve the same level of activity of which they were capable preoperatively following discharge from hospital. This may include minor discomfort and the use of simple analgesic medication. Complete recovery was not measured because of the huge variation in this nonquantitative measure. Many patients either did not work or were elderly, and therefore the time to return to work was not used as an end point.

A comparison was made by investigating 4 operative groups: laparoscopic cholecystectomy, laparoscopic inguinal hernia repair (TAPP), laparoscopic colorectal resec-

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tional, and nonresectional surgery. The nonresectional group included incisional hernia repairs, parastomal hernia repairs, and adhesiolysis, in which the surgeon has a specialist interest and expertise. The colorectal group case mix mirrors the practice of a general surgeon with a specialist interest in colorectal surgery.

Patients with a BMI over 35, bulky/locally advanced malignancies, or who refused to consent to a laparoscopic operation were excluded and underwent open surgery. The laparoscopic colorectal group is by definition a selected group, but it was the intention of this study to determine outcomes of patients undergoing optimal totally laparoscopic surgery and not all-comers. However, during the study period, 70% of colorectal patients in our unit underwent totally laparoscopic surgery. The remaining 30% of patients had open procedures or had laparoscopic-assisted or laparoscopic converted to open operations. These patients were excluded in order to clearly assess the short-term outcomes in patients who had complete laparoscopic surgery.

Statistical analysis was performed using the Mann-Whitney U test for nonparametric data using StatsDirect.

RESULTS

Between January 2003 and October 2006, 486 patients underwent successful unconverted laparoscopic surgery, performed by one surgeon (M.C.P.). During this time 126 laparoscopic cholecystectomies, 161 laparoscopic inguinal hernia repairs (TAPP), 80 laparoscopic colorectal non-

resectional operations, and 119 laparoscopic colorectal resections were performed.

The combined colorectal surgery group included 78 male and 121 female patients (total 199) with a mean age of 75 years. Three patients died within 30 days of their surgery (1.5% mortality). These 3 patients had undergone an anterior resection for rectal cancer. One death was secondary to an anastomotic leak and sepsis with multi-organ failure, and 2 occurred following a myocardial infarction.

In the laparoscopic colorectal group, 60% of the patients had a bowel resection (n=119), which included 56 anterior resections (28%), 16 right hemicolectomies for cancer (8%), 14 left hemicolectomies (7%), 12 resectional operations for inflammatory bowel disease (6%), 10 interval appendicectomies (5%), 7 sigmoid colectomies for benign disease, (3.5%) and 4 abdomino-perineal resections (2%).

In the nonresectional laparoscopic colorectal group, 43 patients underwent adhesiolysis (22%), 26 incisional hernia repairs (13%), 4 parastomal hernia repairs (2%), 4 rectopexies (2%), and 3 reversal of Hartmann's (1.5%) (Figure 1).

Hospital Stay

The median hospital stay for patients who had either a laparoscopic cholecystectomy (n=126) or a laparoscopic inguinal hernia repair (n=161) was 1 day. The majority

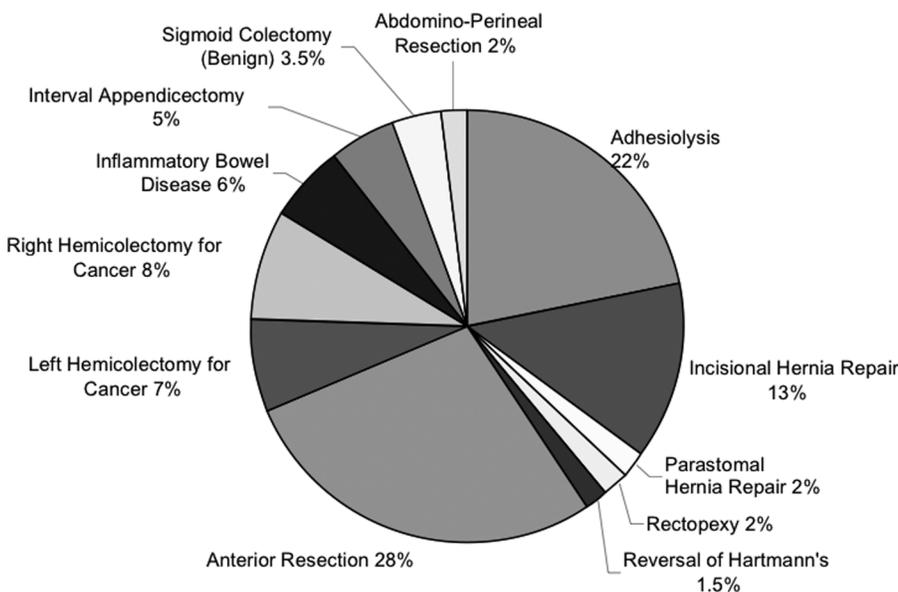


Figure 1. Case distribution of colorectal procedures (N=199).

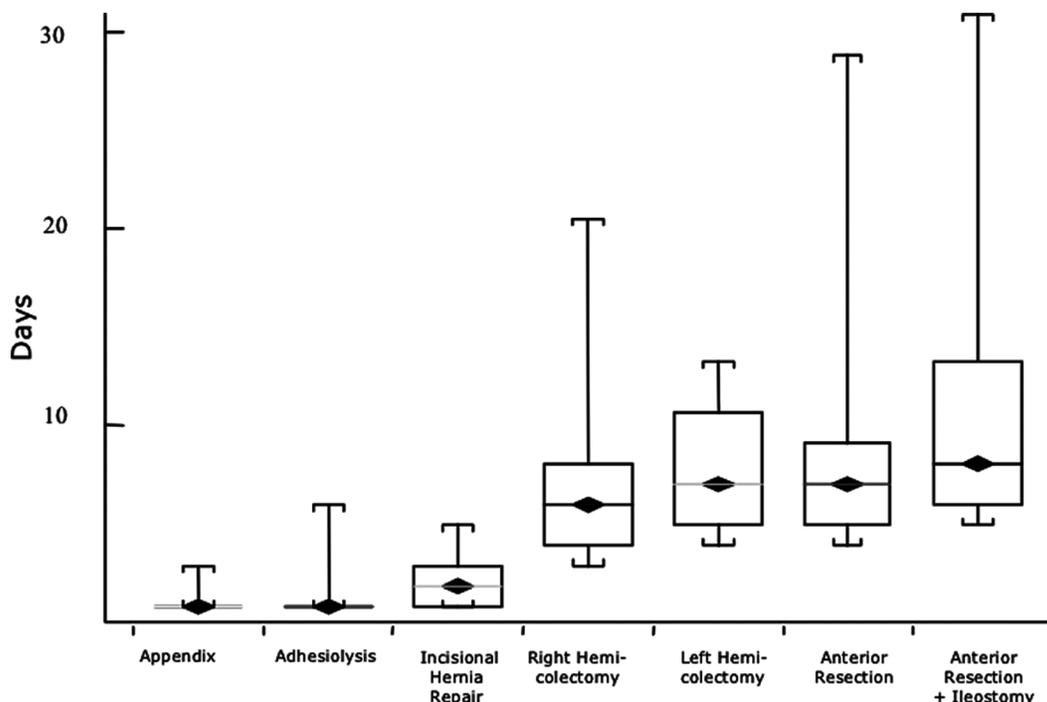


Figure 2. Box and whisker plot of hospital stay (days) by type of procedure. min -[lower quartile - median - upper quartile]- max.

(94%) of these patients were treated as outpatients or with an overnight stay on a 23-hour ward.

For the colorectal group (n=199), the overall median stay was 5 days (range, 1 to 30).

Subgroup analysis showed that the median stay for patients who had a resection of the left colon or rectum was marginally longer at 7 days (P<0.001) (Figure 2). This was increased to 8 days for those patients who also had the formation of an ileostomy.

The length of hospital stay has reduced with time during the study period from a median of 7 days for all laparoscopic colorectal resections to a median of 5 days (P<0.005) (Figure 3). This follows the introduction of the enhanced recovery program in 2003/2004.

Return to Activity

The time taken for patients to regain their preoperative level of activity following surgery was a median of 4 days (range, 2 to 8) after discharge in the laparoscopic cholecystectomy group and 5 days (range, 1 to 12) in the hernia group. For those in the colorectal group, they returned to normal activity within 6 days (range, 1 to 22) of their discharge from the hospital (Figure 4).

Within the colorectal patient group, the time to return to normal activity varied depending on the type of surgery undertaken (Figure 5). Overall, patients who did not

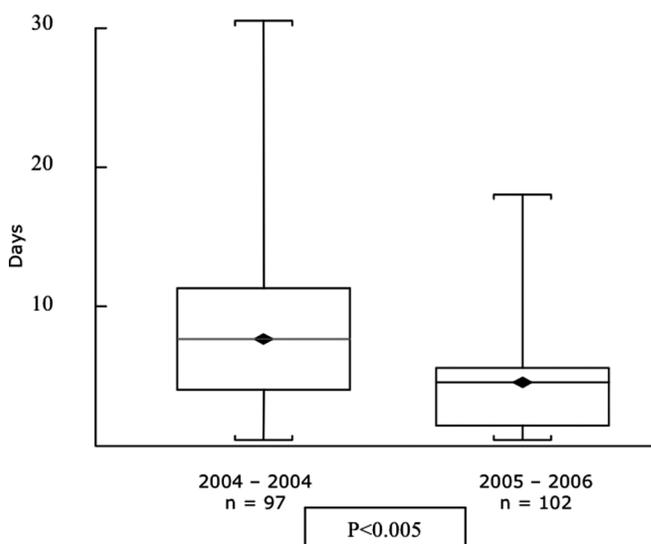


Figure 3. Box and whisker plot of the median length of hospital stay following laparoscopic colorectal resection before and after implementation of enhanced recovery program. min -[lower quartile - median - upper quartile]- max.

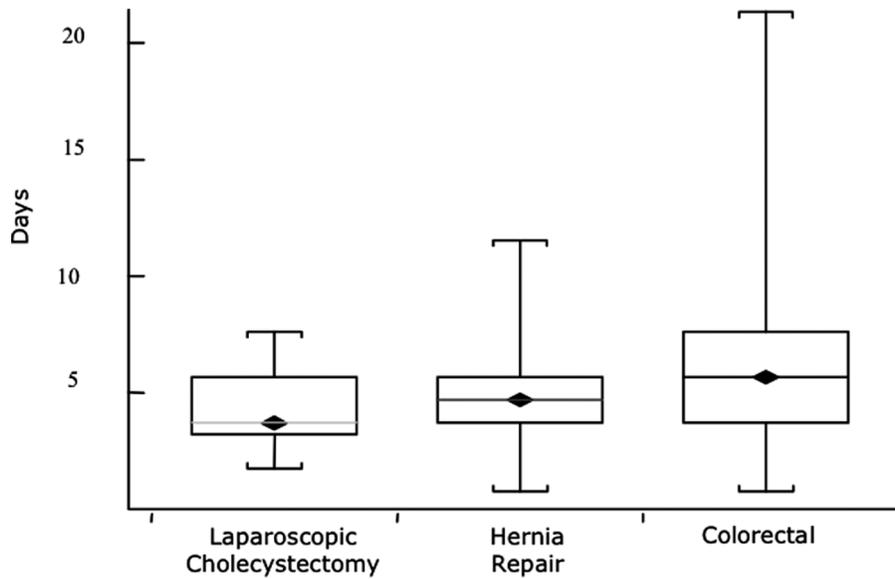


Figure 4. Box and whisker plot of the return to full activity following discharge by group (Days). min -[lower quartile - median - upper quartile]- max.

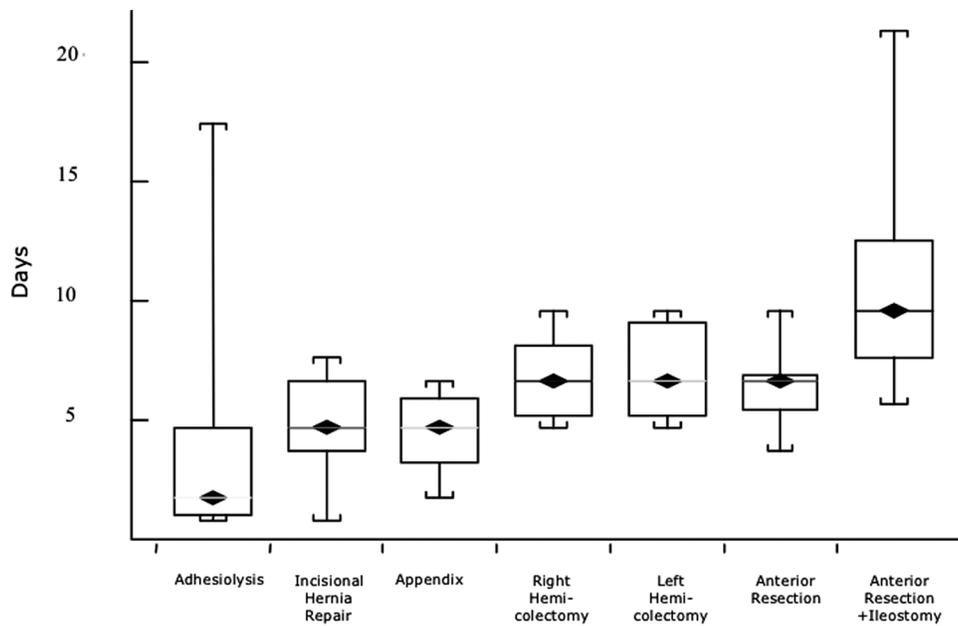


Figure 5. Box and whisker plot of the return to full activity (days) by operation. min -[lower quartile - median - upper quartile]- max.

have a colorectal resection had a median time to recovery of 3 days (2 days following adhesiolysis and 5 days following incisional hernia repair) compared with patients who had a colorectal resection who took a median of 7 days to recover their preoperative level of activity, irre-

spective of site of resection ($P < 0.001$) (**Figure 6**). Patients having an anterior resection and covering ileostomy had a total recovery time of 10 days. An ileostomy or stoma increases the recovery time by an additional 3 days ($P < 0.001$).

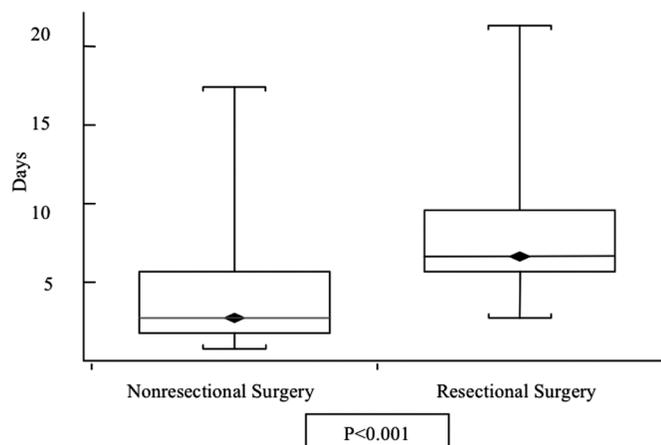


Figure 6. Box and whisker plot of the return to full activity (days) – colorectal subgroup analysis. min -[lower quartile - median - upper quartile]- max.

DISCUSSION

Laparoscopic colorectal surgery commenced in this unit in 1995. Hand-assisted and laparoscopic-assisted resections were part of the early experience and were performed in the CLASSIC trial. With experience, we now perform more procedures totally laparoscopically and have a lower conversion rate. We have excluded laparoscopic operations that were converted to open procedures, although during the study period this represents <10% of all the patients who were due to undergo laparoscopic surgery in our unit. The sole intention of this study was to evaluate the exact and true short-term outcome of hospital stay and home recovery to total independence following unconverted laparoscopic surgery. We accept that there will be an inherent bias and limitations, as this study is nonrandomized, but we have defined a clear group of patients and studied them with a view to evaluate the 2 stated outcomes.

Laparoscopic surgery and enhanced recovery programs have contributed to reducing hospital stay and promoting early mobilization following surgery^{1-3,5-7} without increasing the risk of complications.² The length of hospital stay is an effective and simple method of measuring the quality of care. It reflects an uncomplicated postoperative recovery and the effective implementation of an enhanced recovery program. The time taken to return to full activity gives an insight into the overall stress of surgery and the patient's response. Only one study has quantified return to domestic activity following laparoscopic colorectal surgery, which describes the time to walk independently and return to household activity.¹¹ The results were expressed

as means, and the study did not involve an enhanced recovery program. A recent presentation¹² at the Annual Meeting of the Association of Surgeons of Great Britain and Ireland demonstrated a significant difference in return to normal diet, walking one mile, return to driving and work between open and laparoscopic colorectal surgery but was limited by the small numbers and the measurement of several endpoints. Other studies¹³ have attempted to quantify improvements in recovery following laparoscopic colorectal surgery but have used quality of life questionnaires.

We report the length of hospital stay and the time to return to full activity following laparoscopic colorectal surgery within an enhanced recovery program and use the same outcomes following laparoscopic cholecystectomy and laparoscopic hernia repairs as a control for comparison. The times to discharge and return to full activity are reproducible and are reflected in the narrow interquartile ranges (as represented in the illustrations).

The length of hospital stay for the laparoscopic colorectal resection group has decreased with time from 7 days to 5 days, which represents the increased experience of the multidisciplinary team involved in the care of the patients and introduction of the enhanced recovery program. It is also dependent upon changing attitudes of the clinical personnel and expectations of patients.

Recently published data from the United Kingdom National Bowel Cancer Audit for 2004–2005¹⁴ give an average length of hospital stay following all colorectal resections for cancer of 13 days and a median stay following elective open resection of 11 days. In comparison, laparoscopic colonic resections in our unit have a median stay of 7 days and following the introduction of an enhanced recovery program as low as 5 days (**Figure 7**).

The length of stay increases by a day if the patient requires training to achieve independence with stoma management. Experienced stoma counseling and patient training by our stoma nurses in the preoperative period is vital to prevent prolonged hospital stays and delays in discharge.

A patient's return to full activity after laparoscopic colorectal surgery compares favorably with the short recovery of patients following laparoscopic cholecystectomy, laparoscopic inguinal hernia repair, and laparoscopic nonresectional abdominal surgery. Surprisingly, the recovery is measured in days rather than weeks despite the more extensive surgery.

Postoperative complications and comorbidity will affect the length of hospital stay and recovery. This study pro-

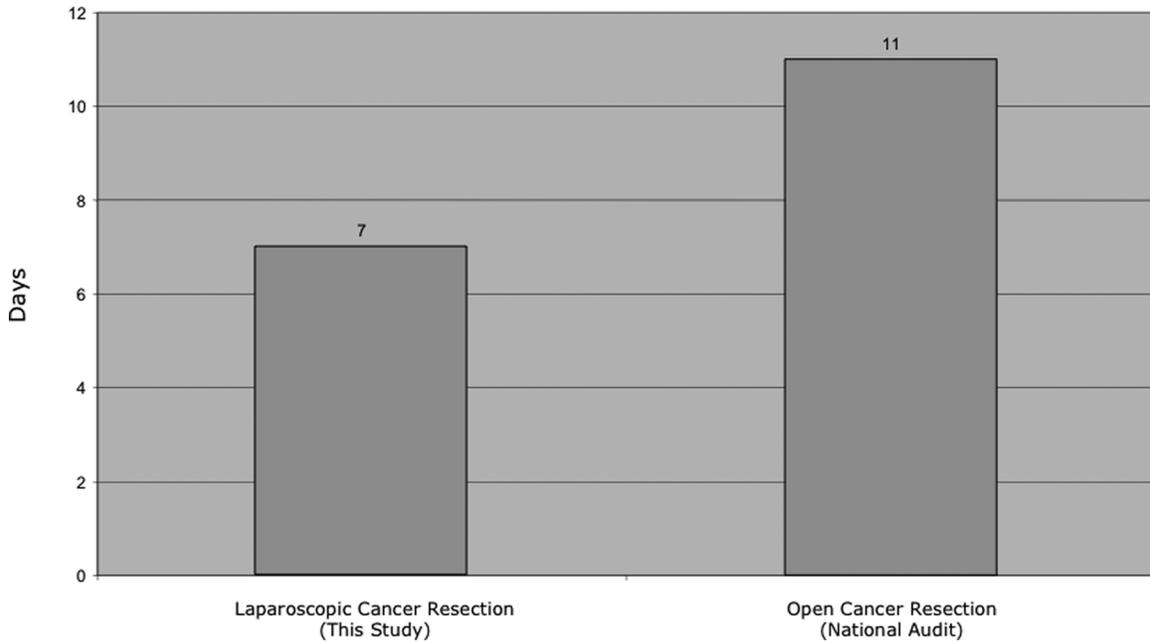


Figure 7. Length of hospital stay - comparison with National Audit figures for the United Kingdom.

vides a quotable parameter that can be used to inform patients of their likely time to discharge from the hospital within an enhanced recovery program following laparoscopic surgery. Furthermore, the study also allows a degree of expectation of time to total independence following discharge from the hospital, which will allow caregivers to plan for the postoperative recovery period. It provides a clearer expectation to employers and employees with regards to the anticipated time to return to work. This may be especially pertinent for the self-employed patient.

Patient education and emphasis on early mobilization and persistence with activity after discharge will enable an early return to work. With respect to this, primary care practitioners can target sick certification in accordance with patients' mobility, independence, and freedom from pain rather than the arbitrary 2 to 3 months off work as practiced currently. In the long-term, hospital stay is not the only saving to be considered a benefit of laparoscopic surgery, but the larger saving to health services and the economy by patients returning to work early is only to be encouraged. The increasing use of laparoscopic surgery has huge implications for the future, both for the patient and financially for the hospital and taxpayer. The extra cost of laparoscopic instrumentation and training needs to be balanced by the reduced costs in shortened hospital stay, reduced postoperative care, and more rapid return to normal activity and work.

CONCLUSION

Laparoscopic colorectal surgery allows for short hospital admissions with rapid recovery to full normal activity and compares favorably with laparoscopic cholecystectomy, laparoscopic hernia repair, and national data for open surgery. Prospective studies with health economic analysis are necessary to ascertain whether this proven short-term benefit translates into universal savings for hospital, community, and national resources.

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