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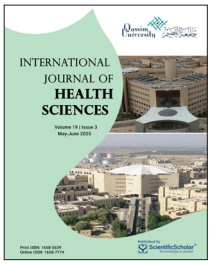

Original Article

Patient initiated follow-up for incisional hernia repair

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ABSTRACT

Objectives: This study detailed the outcomes of operatively managed incisional hernia and evaluated the feasibility of patient-initiated follow-up.

Methods: A retrospective cohort study was conducted on 71 adult patients (patients) who underwent elective incisional hernia repair from 2021 to 2024 at a tertiary center. Seventy-one adult patients who underwent elective incisional hernia repair and attended follow-up were included in the study. The cohort comprised 45 females (63.4%) and 26 males (36.6%), with a median age of 57 years (range 31–78). The type of hernia repair, post-operative complications, emergency department (ED) visits post-discharge, and outcomes from the first outpatient review were studied. The need for changes in management during follow-up was assessed.

Results: Out of 77 patients, 71 patients were included after exclusion of those who had in-hospital complications. Of these, 54 had ventral hernias, nine had post-nephrectomy, four had parastomal, and four combined ventral and parastomal hernias. Only 7 patients (9.9%) required changes in management during the first outpatient clinic appointment ($P < 0.05$) with median (interquartile range) waiting time of 8(5) weeks. Nine patients (12.7%) visited the ED before their scheduled clinic appointment for pain, seroma, hematoma, or wound complications.

Conclusion: The low rate of management changes and limited ED visits suggested that patient patient-initiated follow-up model could safely replace routine follow-up appointments for post-incisional hernia repair. This transition could optimize outpatient services, reduce wait times, and potentially offer cost savings for both healthcare and patients. By minimizing routine appointments, healthcare resources can be allocated more efficiently, enhancing patient care and reducing overall healthcare expenditures.

Keywords: Healthcare resource optimization, Hernia surgery outcomes, Incisional hernia repair, Outpatient follow-up, Patient-initiated follow-up, Post-operative care, Ventral hernia

INTRODUCTION

The healthcare system consistently strives to enhance patient care while optimizing resource allocation, particularly in outpatient care. The UK National Health System (NHS) delivered 95 million outpatient appointments, nearly 2 million appointments/week in 2021/2022. As of February 2023, there were 7.22 million patients waiting to start treatment.[1] This increase in demand places substantial pressure on resources and creates inefficiencies, especially when many follow-up appointments offer limited clinical value. As a result, the system is often strained, leading to longer wait times and reduced patient satisfaction. Reducing unnecessary follow-up appointments has become a critical focus in efforts to alleviate these pressures and optimize resource allocation.

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Patient-initiated follow-up (PIFU) offers a promising solution to these challenges by allowing patients to request follow-up appointments based on their symptoms, rather than adhering to a fixed schedule. This model aims to reduce the number of unnecessary visits, improving both patient care and satisfaction while freeing up healthcare resources for those with more complex needs. A previous study demonstrated that introducing a structured PIFU protocol for patients with rectal bleeding significantly reduced the number of follow-up appointments from 45% to 6% without compromising patient safety or outcomes and highlighted the broader applicability of PIFU models across surgical specialties.[2] Furthermore, national policy has also prioritized the expansion of PIFU, with NHS England targeting a 25% reduction in follow-up outpatient attendances from 2019 to 2020 levels by March 2024. A mixed-methods rapid evaluation identified PIFU as a key innovation being widely implemented across the NHS, noting its potential to reduce unnecessary appointments while supporting a more patient-centered service. However, the report also emphasized the need for further research on patient outcomes, staff experience, and health inequalities associated with PIFU implementation.[3]

Incisional hernia, defined as a hernia occurring at the site of a previous surgical incision, is a common complication following abdominal surgery. A previous study reported a weighted incidence of 12.8% 2 years after a midline incision.[4] These hernias frequently require surgical intervention, as they can become symptomatic and lead to significant complications if left untreated.[5] Despite this, post-operative follow-up is often scheduled at fixed intervals, irrespective of the patient's individual recovery or ongoing condition.

This study aimed to evaluate the outcomes of patients who underwent elective incisional hernia repair, a procedure with a generally predictable recovery, to determine the efficacy and safety of adopting the PIFU model. Key considerations include the frequency of post-operative complications, the necessity for management changes during follow-up, and emergency department (ED) utilization before outpatient reviews. The primary objective of the study was to evaluate the necessity of routine follow-up appointments by assessing the proportion of cases requiring changes in management during the initial clinic review. The secondary objective was to investigate the incidence of ED visits before scheduled clinic reviews, potentially indicating an unmet need for earlier clinical intervention.

MATERIALS AND METHODS

Study design

This study employed a retrospective cohort design to evaluate the safety and feasibility of a PIFU model in patients undergoing elective incisional hernia repair. The study was conducted at a tertiary care center in the UK and included data from January 2021 to May 2024. Patient electronic medical records were reviewed to collect relevant clinical data, including type of hernia repair, surgical technique (laparoscopic or open), post-operative complications, ED visits post-discharge, and clinic-based management decisions during follow-up.

Study population and sampling

The study population consisted of adult patients who underwent elective open incisional hernia repair during the study period. Patients were identified through the hospital's surgical database. Inclusion was limited to those who attended at least one routine post-operative outpatient review. Patients were excluded if they required interdisciplinary operations, emergency surgery, or had post-operative complications requiring hospital or intensive care admission, including pulmonary embolism (PE), hematoma, wound dehiscence, surgical site infection (SSI), intensive care unit (ICU) admission, or urinary retention.

Hernias were classified into three groups based on surgical records: Ventral, parastomal, and combined ventral-parastomal. Ventral hernias were further categorized using the European Hernia Society classification, which divides hernias into midline (M1–M5) and lateral (L1–L4) subtypes according to anatomical location.[6]

Study outcomes

The primary outcome measured was the need for changes in clinical management during the first outpatient follow-up. The secondary outcome was the incidence and nature of ED visits before the scheduled review, which may reflect early post-operative complications or unmet clinical needs.

The rationale for applying a PIFU framework to this patient group was informed by prior evidence suggesting that patients undergoing procedures with relatively predictable recovery are suitable for self-monitoring and delayed follow-up models.[7]

Analysis and registration

Descriptive statistics were used to summarize demographic and clinical characteristics of the cohort. The proportion of patients requiring changes in management or presenting to the ED before follow-up was calculated. Continuous data were reported as medians with interquartile ranges (IQR), and categorical data as frequencies and percentages. Statistical significance was set at $p < 0.05$. Data analysis was performed using Microsoft Excel and the Statistical Package for the Social Sciences for statistical comparison.

Ethical approval was granted before the commencement of this study from the Quality Improvement and Audit

Department. Consent was waived due to the retrospective nature of the study, and data were analyzed anonymously.

RESULTS

Seventy-seven patients were initially included in the study, but six patients were excluded due to post-operative complications that occurred during their hospital stay, leaving a final cohort of 71 patients [Figure 1]. The complications leading to exclusion were as follows: Post-operative PE, post-operative hematoma, wound dehiscence, SSI, ICU admission, and urinary retention.

Of the 71 patients analyzed, 45 were female (63.4%) and 26 were male (36.6%), with a median (IQR) age of 57 (20) years (range 38–78 years). The types of hernias included 63 ventral hernias (88.7%), 4 parastomal hernias (5.6%), and 4 combined ventral and parastomal hernias (5.6%) [Table 1]. Four cases had previously undergone a single incisional hernia repair and recurred, while one case had two previous repairs before recurrence. Three cases were performed laparoscopically, while the rest were managed through open surgery.

Logistic regression analysis identified age as a significant independent predictor (odds ratio 1.09/year; $P = 0.037$), while gender, surgical approach, and previous repair history were not statistically significant. Seven (9.9%) patients required changes in management during their first outpatient review. A cross-tabulation by hernia type showed that combined hernias were disproportionately represented, accounting for three of the seven management changes [Table 2]. Chi-square testing confirmed a statistically significant association between hernia type and need for management change ($P = 0.016$).

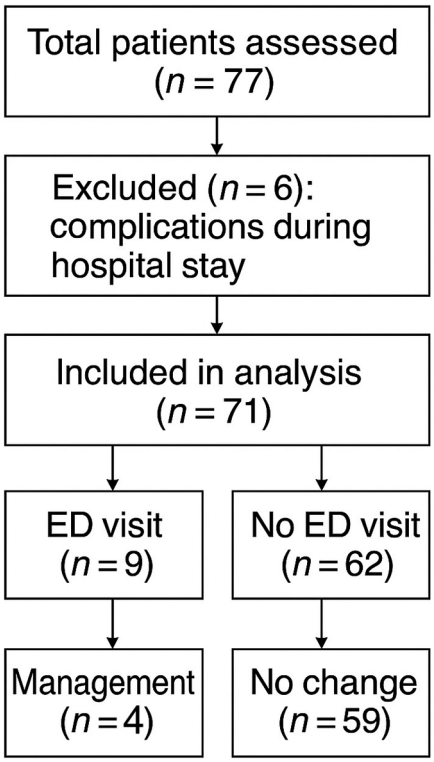

Figure 1: Patients' selection flow chart. ED: Emergency Department.

Three patients with combined ventral and parastomal hernia repairs underwent further interventions, including a computer tomography (CT) scan to assess possible recurrence. One patient had an ultrasound scan requested for a suspected seroma, with no further management needed afterward. Two patients were advised on the proper use of an abdominal binder, and one was prescribed a course of antibiotics for a SSI. Of the recurrent cases, only one required a change in management during the clinic visit, which included advice on using an abdominal binder. None of the recurrent cases presented to the ED with concerns before the clinic review.

The incidence of ED visits before scheduled clinic reviews

Nine patients (12.7%) visited the ED before their scheduled outpatient clinic appointment, with a median time to presentation of 10 days. Four cases presented with pain secondary to seroma, all of which were managed conservatively. Two patients with post-operative collections required interventional radiology drainage. One patient

Table 1: Number and type of hernias according to their anatomical classification.

Type of hernia	Number of participants (%)
Midline (M)	
M1 Subxiphoid	1 (2)
M2 Epigastric	7 (11)
M3 Umbilical	14 (22)
M4 Infraumbilical	11 (17)
M5 Suprapubic	10 (16)
Lateral (L)	
L1 Subcostal	2 (3)
L2 Flank	9 (14)
L3 Iliac	8 (13)
L4 Lumbar	1 (2)

Table 2: Management changes by hernia type.

Hernia type	Patients (*n*)	Management changes (*n*)	%
Ventral	63	3	4.8
Parastomal	4	1	25.0
Combined	4	3	75

presented with a hematoma, and another returned to the ED 5 weeks postoperatively with bowel obstruction and subsequently underwent a laparotomy. One patient developed sepsis, requiring hospital admission and antibiotic treatment.

Outpatient clinic review timing

The median waiting time for the first outpatient review was 8 weeks. This timeframe appeared sufficient for most patients, as few required urgent care or significant management.

DISCUSSION

This study suggested that transitioning to a PIFU model for post-incisional hernia repair follow-up could be both safe and effective. Only 9.9% of patients required changes in management during the first outpatient review, and 12.7% visited the ED for generally mild concerns, indicating that routine follow-ups may be unnecessary for the majority of patients. Previous research showed that patient-reported outcomes were 85% sensitive in detecting a swelling, and 81% specific to detect recurrence. In other words, patients who develop an incisional hernia are already aware of its presence due to noticeable changes in appearance or symptoms.[8] This is further supported by more evidence indicating that only up to one-third of patients may not be aware that they have an incisional hernia.[9] These unaware patients tend to be older and present with smaller hernias.[9] This awareness implies that many patients, especially those with recurrent hernias, can recognize early signs and seek care as needed, supporting the feasibility of the PIFU model. Recurrence rates for incisional hernias have been reported to increase gradually over time, reaching 6%, 8%, 11%, and 12% at 2, 5, 10, and 15 years, respectively.[10] Given this long-term recurrence pattern, a routine follow-up appointment scheduled shortly after surgery may not be effective in detecting recurrences, further supporting the use of a flexible, patient-driven follow-up model.

Conventionally, post-operative follow-up for incisional hernia repair has involved routine scheduled clinic visits. During these appointments, patients are assessed for complications such as infection, recurrence, or wound complications. This model provides a standardized approach to care, ensuring that all patients receive a physical examination and professional evaluation, regardless of whether they are experiencing symptoms. While the routine follow-up approach offers reassurance and allows for early detection of complications, it often results in unnecessary visits for patients who are recovering well. Consequently, it can place a significant strain on healthcare resources, contributing to overburdened clinics and longer waiting times for patients who require more urgent attention.

Patients with combined ventral and parastomal hernias may benefit from routine follow-up, as they accounted for 3 out of the 7 cases (42.8%) that required changes in management in our study. These patients tend to have more complex recovery trajectories due to the technical challenges and physiological burden associated with dual-site repairs. This complexity increases the likelihood of post-operative complications, such as wound infections and healing difficulties, which often require timely medical intervention. A previous study reported a significantly higher incidence of surgical site complications, including hematoma, seroma, skin dehiscence, and fat necrosis, in the complex abdominal wall reconstruction with ostomy compared to the ventral hernia-only group. These findings highlight the need for more structured post-operative follow-up for patients with combined repairs, as their recovery may present additional challenges compared to those undergoing isolated ventral hernia repair.[11] Therefore, routine follow-up in these patients could help in detecting complications early, potentially leading to better post-operative outcomes.

In addition, patients who have undergone complex surgeries requiring significant additional management, joint procedures with other specialties, or specialized interventions such as mesh removal or excision of an enterocutaneous fistula should also remain on a routine follow-up schedule. Their more complex recovery necessitates regular check-ups to detect potential complications early and ensure the best possible outcomes. Previous research has demonstrated that patients who underwent concomitant procedures experienced significantly higher rates of SSIs compared to those who had hernia repair alone.[12] This highlights the importance of ongoing surveillance in complex cases to mitigate risks.

In contrast, the PIFU model shifts the responsibility of follow-up to the patients themselves. Rather than attending routine appointments, patients are empowered to seek clinical intervention only when they experience symptoms that warrant medical attention. This approach has several advantages: it reduces unnecessary clinic visits, optimizes the use of outpatient services, and frees up healthcare resources for patients who require more intensive care. By improving patient autonomy and satisfaction, PIFU addresses both the logistical and financial strains on healthcare systems. For instance, with each outpatient hospital visit costing approximately £120,[13] there is a potential for significant cost savings.

This highlights that PIFU can successfully maintain patient satisfaction while reducing unnecessary appointments, though its effectiveness depends on the patient's ability to self-monitor and seek timely intervention. For patients with limited health literacy or confidence in self-monitoring, additional education and support are crucial to ensure that complications are recognized and addressed promptly.

Supporting evidence for this can be found in a study of PIFU in colorectal cancer patients. The study revealed no significant differences in patient satisfaction between PIFU and hospital follow-up when it came to reassurance, access to specialist support, time spent with healthcare providers, or involvement in decision-making with a positive follow-up experience in the PIFU model.[13,14]

This study highlights the potential for PIFU to be safely implemented in the post-operative care of selected patients undergoing incisional hernia repair. For clinicians, this approach offers an opportunity to reduce the burden of routine follow-up appointments, particularly for patients with straightforward recoveries. The surgical teams can better allocate resources to those with more complex needs by identifying suitable patients for PIFU and providing them with clear discharge instructions and guidance on when to seek help. Establishing clear eligibility criteria and ensuring accessible re-referral pathways will be essential for safe implementation. Incorporating PIFU into standard practice may also help improve clinic capacity, reduce wait times, and enhance patient autonomy without compromising care quality.

One of the limitations of this study includes a relatively small sample size, and the follow-up period mainly focused on short-term outcomes. Future studies should include larger patient populations and longer follow-up periods to assess the long-term safety and efficacy of the PIFU model, particularly in detecting late recurrences. In addition, while this study demonstrated that most patients can be managed well under the PIFU model, further research is needed to evaluate its applicability to specific subgroups, such as those with more complex hernias or comorbid conditions. Incorporating patient education and support mechanisms will be critical to ensure the success of PIFU in broader clinical practice**.** Further prospective studies and cost-effectiveness analyses are needed to confirm the long-term sustainability and clinical benefits of this model across diverse patient groups. These studies should also address the impact of PIFU on patient-reported outcomes and satisfaction, ensuring that patients are both confident and supported in managing their own follow-up care.

CONCLUSION

The adoption of a PIFU model could optimize healthcare resources, reduce unnecessary clinic visits, and maintain a high standard of patient care. By allowing patients to initiate follow-up appointments based on symptoms rather than fixed schedules, PIFU can enhance patient autonomy and improve the efficiency of outpatient services. Specific patient subgroups, such as those with combined ventral and parastomal hernias or complex surgical cases, may benefit from continued routine follow-up to ensure potential complications which are identified early and managed effectively.

Authors' contributions: MY: Conducted data analysis, interpretation, and writing up; AE: Data collection and organization; HE: Supervisor of project registration and collection of the data; MEB: Supervised the project, contributed significantly to the study design, data interpretation, analysis, manuscript writing, and revision.

Ethical approval: Ethical approval was granted before the commencement of this study from the Quality Improvement and Audit department, Guy's and St. Thomas' Hospital, London, number 16613.
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Availability of data and material: The corresponding author holds the data extracted from included studies and the data used for analysis. Materials used in the review are not publicly available.

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