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Quality Improvement Report

Improving the assessment of acute pain in adult inpatients: a quality improvement project*

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Summary

Acute pain remains a significant issue for inpatients, for example, 20–40% of surgical inpatients report severe pain in the first 24 postoperative hours. Simple pain rating scales are widely used but have limitations. National guidelines recommend incorporating functional assessment to guide individualised pain management, though how best to do this remains unclear. This quality improvement project aimed to enhance the assessment of acute pain in adult inpatients at Leeds Teaching Hospitals by introducing functional assessment alongside standard pain scoring. Applying the Model for Improvement and Plan–Do–Study–Act cycles, we prototyped a Leeds Functional Activity Score and evaluated its usability across three cycles. Once the methodology of assessing functional pain was prototyped (cycle one), 79 adult inpatients' pain was assessed using both Leeds Functional Activity Score and the Numeric Rating Scale (cycle two). We found pain intensity patterns did not always predict functional impact. Functional assessment enabled conversations with patients about the need to manage function rather than targeting a pain score. Cycle three involved evaluation by 37 ward staff, with 73% rating it as `easy´ or `very easy´ to use. This cycle helped us to identify training needs. This report demonstrates that implementing functional assessment alongside traditional pain scoring is feasible, well received by staff and provides clinically meaningful context to guide analgesia. The Leeds Functional Activity Score has now been integrated into the hospital's electronic systems, alongside supporting training videos and communications.

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Introduction

Acute pain is a common and significant issue for hospitalised medical and surgical patients despite advances in analgesia. As an example, 20–40% report severe pain within the first 24 hours postoperatively, a figure that has remained largely unchanged over the past two decades [1]. Poorly managed acute pain can lead to increased risks of pulmonary complications, greater morbidity and increased risk of the development of chronic pain and long-term opioid use in patients under the care of all specialities [2, 3].

Introduced in the 1990s, the now abandoned `Pain as the Fifth Vital Sign´ initiative [4] led to the widespread use of unidimensional tools for pain assessment, such as the Numeric Rating Scale (NRS) [5]. These tools rely on patients attributing a single score to their pain. They are simple and quick to use [6], yet concerns have grown about their subjective nature and the risk of either over- or under-treating pain [7]. Cut-off points commonly used by staff to administer analgesia do not necessarily reflect a patient's wish for additional pain relief, and patients have also reported difficulties in describing the complexity of their pain experience by a single numerical value, descriptive words or as a mark on a line [8].

The focus on achieving the lowest possible pain scores has inadvertently played a role in exacerbating the opioid epidemic, as opioids have been prescribed to treat a number or a score [4]. A study in the USA reported a 50% increase in opioid over-sedation and adverse drug reactions following the introduction of routine numerical pain assessments [9]. Opioids can cause significant side effects, such as respiratory depression, nausea and bowel dysfunction [2], contributing to increased patient dissatisfaction. The development of opioid dependence in the longer term is now considered a public health crisis and a cause of increased healthcare resource utilisation. Effective opioid stewardship is necessary to manage acute pain effectively and to make the safest and best use of analgesia [10].

The Royal College of Anaesthetists, the British Pain Society, the Faculty of Pain Medicine, the Royal Pharmaceutical Society and Pain UK promote the use of multidimensional, functional activity scoring for improving pain assessment and therefore appropriate pain management [8, 11, 12]. However, a scoping literature search (Appendix 1) revealed that no standardised tool for routine functional pain assessment is currently in widespread use or recommended by the above professional bodies. The Australian and New Zealand College of Anaesthetists (ANZCA) offers a three-point system of functional pain assessment. Patients are assessed as having no limitation, mild limitation or significant limitation to function [13], but this system lacks further detail on how to operationalise it or standardise assessments.

To promote improved assessment of acute pain in our hospital, we undertook a quality improvement (QI) project. We aimed to enhance assessment of acute pain by developing and evaluating a functional pain assessment tool for use in adult inpatients at Leeds Teaching Hospitals NHS trust (LTHT). Our aims were to:

1. Prototype and implement a functional assessment tool, called the Leeds Functional Activity Score (LFAS), to be used alongside pain intensity scoring and to encourage functional assessment.
2. Assess the practicality of carrying out functional pain assessment on inpatient wards.
3. Identify barriers and facilitators to implementation of functional pain assessment, ensuring alignment with national guidance and local practice.

Methods

This project was conducted under the University of Leeds Extended Student-Led Research or Evaluation (ESREP) framework (Project Code 23-STU-0010). We applied the Model for Improvement framework and Plan–Do–Study–Act (PDSA) cycles to introduce, test and refine a tool to encourage functional pain assessment [14]. We did not aim to validate the use of a new instrument. The overview and project timeline are shown in Supplementary File 2. This report follows the SQUIRE 2.0 checklist [15].

Development of the Leeds Functional Activity Score

Our selection of functional components for the score was guided by recognised recovery targets and indicators of effective recovery described in Enhanced Recovery After Surgery (ERAS) framework [16]. These emphasise the importance of early restoration of core physical functions; therefore, the LFAS focused on three key activities: deep breathing, coughing and mobilisation. Carrying out these activities effectively are widely considered as markers of good recovery after major surgery and included in National Health System (NHS) recommendations [17]. The LTHT Acute Pain Team also use the ability to deep breathe, cough and move in the assessment of pain in medical patients.

The structure of the LFAS was adapted from the functional activity score proposed by ANZCA [13], which uses a three-point scale. To enhance usability and facilitate integration with existing pain assessment practices, the LFAS was expanded to a four-point scale corresponding directly to the categories already familiar to LTHT ward staff, being the four-point numerical rating scale (none, mild, moderate and severe pain). This alignment was intended to promote familiarity and to aid incorporation into routine assessment.

The final four-point LFAS structure used is as follows:

A: No limitation due to pain.
B: Mild limitation due to pain.
C: Moderate limitation due to pain.
D: Severe limitation due to pain.

The tool was subsequently refined through the following three cycles:

Cycle one

The LTHT acute pain team prototyped an initial functional assessment tool with respiratory function and mobility assessed separately, each using a four-point scale (see Supplementary File 3). This brief initial test highlighted occasional conflicting scores between the two components, indicating the need for a more unified and streamlined approach.

Cycle two

Following informal feedback from the acute pain team, the LFAS was therefore revised into a single combined score encompassing both mobility and respiratory function, as presented in Fig. 1. This modification provided a more holistic representation of overall functional limitation, improving consistency and interpretability for ward staff. The revised tool was subsequently introduced onto the wards by project staff, where it was used during acute pain ward rounds to assess patients' functional pain alongside the NRS for assessment of pain intensity. Patients report their pain on the NRS scale as none, mild, moderate or severe. We included adult medical and surgical inpatients aged 18 years or above, who were able to communicate and participate in functional assessment. We excluded patients with significant cognitive impairment, decreased consciousness level and those whose baseline function was unknown.

Cycle three

The final version of the LFAS (Fig. 1) was applied by ward staff in their routine practice. Staff involved in routine observation monitoring (nurses, clinical support workers, ward sisters and student nurses) completed a questionnaire to assess ease of use on a five-point Likert scale (very easy, easy, neutral, difficult or very difficult) alongside open-text feedback on usability and implementation experience. This helped to identify barriers and facilitators for the wider roll out of functional pain assessment using LFAS to all inpatient wards.

Analysis

Quantitative analysis summarised LFAS scores and staff responses using frequencies and percentages. Qualitative analysis of staff feedback involved content analysis by identifying recurring themes related to the usability, training and integration of the LFAS. All data were anonymised at the point of collection and no identifiable patient data were recorded. Data were stored securely on password-protected NHS servers. The project adhered to the principles of the Data Protection Act (1998) [18] and followed Trust protocols for information governance.

Results

Patient data

Plan–Do–Study–Act cycle one focused on trialling an initial version of the LFAS. During this cycle, respiratory and mobility functions were assessed separately. This early prototype did not generate analysable data as it became evident that assessing the two components independently often produced conflicting results, limiting consistency and interpretability. The tool was, therefore, revised into a single, combined score before further evaluation, shown in Fig. 1.

Cycle two involved the assessment of 79 inpatients across 13 wards, covering a range of medical and surgical specialties. Of these, 58 (75%) were surgical patients, with assessments ranging from postoperative day 1 to more than 5 weeks following surgery. The remaining 21 patients (25%) were medical inpatients. The most common finding was an NRS score of 1 (mild pain) and an LFAS grade of A (no limitation due to pain). In 81% of cases, patients reported pain via their NRS score while still maintaining good functional ability according to the LFAS. Conversely, 4% of patients demonstrated noticeable functional

LTHT Functional Activity Score (FAS) When assessing mobility please consider patient's baseline		Select
A	• No limitation of function: Can deep breathe & clear secretions/cough • Mobility is at baseline	○
B	• Pain mildly limits function: Can deep breath, but clearing secretions & coughing may be occasionally limited • Pain mildly limits mobility: Can sit/roll independently & may be able to transfer out of bed	○
C	• Pain moderately limits function: Deep breathing is painful, clearing secretions & coughing is very limited • Pain moderately limits mobility: Can roll & sit up with assistance, patient unable to mobilise from bed to chair	○
D	• Pain severely limits function: Cannot deep breathe, shallow breaths only, unable to cough • Pain severely limits mobility: Can't roll over or sit up in bed even with assistance	○

Developed by Leeds Teaching Hospitals NHS Trust – Adult Acute Pain Team.

Figure 1 Leeds functional activity score.

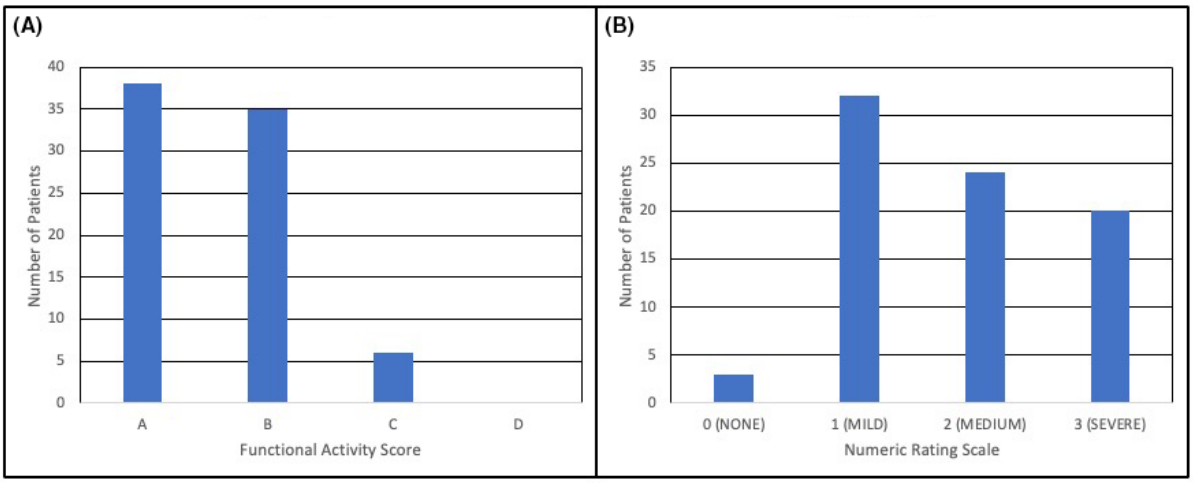

Figure 2 (A) Distribution of LFAS scores; (B) distribution of concurrently recorded NRS pain scores. LFAS, Leeds Functional Activity Score; NRS, numeric rating scale.

limitation despite reporting lower pain intensity via their NRS score (Fig. 2). The full dataset from this phase is provided in Supplementary File 4.

Staff data

Staff evaluation involved written information sent to ward staff by the acute pain team and a brief verbal project overview. Thirty-seven staff across seven wards were observed using the LFAS, including 18 (49%) clinical support workers, 12 (32%) band 5–7 nurses, four (11%) student nurses and three (8%) health care assistants. Twenty-seven staff (73%) rated the LFAS as `very easy´ or `easy´ to use (see Supplementary File 5 for raw data). Content analysis of staff comments identified four overarching themes:

Usability: Most found the tool easy after a short learning period; some noted initial confusion around the grading descriptors.
Training and guidance: A need for formal training and clarity on integration with systems like NEWS was highlighted.
Patient-centred: Staff valued the deeper insight into patients' pain experiences and its role in guiding analgesia.
Communication and application: Challenges arose when patients could not communicate or baseline function was unclear.

Discussion

This QI project was carried out with the aim of improving pain assessment for adult medical and surgical inpatients. We introduced the LFAS, a simple tool designed to promote functional assessment of acute pain within routine clinical practice. National professional bodies now recommend multidimensional approaches to pain assessment, including functional or dynamic pain assessments, yet practical tools to support this remain limited [8, 11, 12]. Our work bridges this gap by developing a functional pain assessment which was easily implemented in a busy inpatient environment. Through a series of PDSA cycles, the LFAS was iteratively refined and evaluated to be usable in a clinical environment.

Direct comparisons between the NRS and LFAS cannot be made, given that these two methods of assessment evaluate different aspects of pain. In most cases, patients reported pain via their NRS score while still maintaining good functional ability according to the LFAS. We found that while patients experience and report pain, in the majority of cases, this did not translate into measurable functional impairment. Rarely, we observed functional limitation despite the patient reporting low pain intensity. These findings highlight the distinct but complementary information provided by each scale: the NRS reflects subjective pain intensity, whereas the LFAS captures pain-related functional impact. The observed discordance between reported pain and functional impairment aligns with previous research which similarly noted a mismatch between patient-reported pain and functional limitations [19]. Our work highlights that pain intensity alone does not necessarily predict functional impact of that pain, demonstrating the value of including functional assessment in routine care and that the sole use of unidimensional pain scales, such as the NRS, does not necessarily inform optimal pain management [13].

Plan–Do–Study–Act cycles one and two show that a more nuanced, multidimensional approach to pain assessment could serve to enhance clinical decision-making, potentially improving patient outcomes. We also found that using the LFAS helped to open the dialogue with patients as to how their pain is best managed and that targeting function as well as intensity may represent better pain management.

In PDSA cycle three, staff evaluation highlighted barriers and facilitators to the introduction of the LFAS, with most participants rating it as `easy´ or `very easy´ to use. This evaluation is important given the time pressures of busy clinical areas. This part of the evaluation also highlighted the need for structured educational initiatives to ensure proper understanding of the LFAS and how to interpret the scores. Comprehensive training using a short video has been produced and integration of the work into existing e-learning modules is planned to improve theoretical understanding and practical application of the LFAS within LTHT.

The project has several limitations. It was conducted at a single centre with a relatively small sample of patients and staff, which limits generalisability. In addition, over half those surveyed were clinical support workers, healthcare assistants or student nurses. Some specialties were not included and in areas where functional limitation may be expected due to the nature of the underlying condition or surgery, such as in orthopaedic surgery, LFAS interpretation may require adaptation. The sample size was small and appropriate for the QI focus but insufficient for formal psychometric validation. Larger, multicentre evaluation is required to assess inter-rater reliability, responsiveness and generalisability. Future work should also explore adaptations for patients with communication difficulties or pre-existing baseline functional limitations as this emerged as a barrier to LFAS use.

Despite these limitations, the LFAS represents a practical, feasible and staff-accepted approach to incorporating functional assessment into routine pain evaluation. It aligns with recognised recovery frameworks, such as ERAS [16], and aims to support holistic and patient-centred analgesia. The LFAS has been adopted across all inpatient wards in our hospital. An educational training video was produced to accompany its introduction. The next stage of the project is inclusion of the assessment score in the electronic patient record system and to evaluate the influence of the LFAS on analgesia prescribing, postoperative recovery time and patient satisfaction. Finally, we plan to undertake a multicentre study to validate the LFAS in other hospitals.

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approved by the University of Leeds Medical School Ethics Committee as part of the University of Leeds Extended Student-led Research or Evaluation (programme. It was prospectively registered with the ESREP programme (project code 23-STU-0010) and with Leeds Teaching Hospitals NHS Trust Audit and Service Evaluation system (LOC0744). Reviewed by Trust Information Governance; need for Caldicott Approval waived.

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Appendix 1

Scoping review search terms:

Functional pain sc* OR dynamic pain sc* AND adult AND inpatient OR in patient.

Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Supplementary File 1. Project protocol.
Supplementary File 2. Flowchart of events.
Supplementary File 3. Prototype score.
Supplementary File 4. Cycle two raw data.
Supplementary File 5. Cycle three raw data.
Supplementary File 6. Squire checklist.