

Persistent Pain and Elective Orthopaedic Surgery: A Research and Rehabilitation Agenda for the NHS 10-Year Health Plan

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Persistent pain is one of the defining health challenges of our time. It affects more than 28 million people in the UK (4), intersects with multiple long-term conditions, and drives both clinical complexity and health system cost. Nowhere is this more evident than in the elective orthopaedic surgical pathway, particularly total knee and hip replacement, where up to 20–30% of patients report persistent pain after surgery, often accompanied by functional limitation and reduced quality of life (1, 9). These figures are unlikely to decrease without a deliberate shift in how the health system anticipates, prevents and responds to pain.

The publication of Fit for the Future: 10-Year Health Plan for England (2) marks an ‘inflection point’. The plan emphasises prevention, neighbourhood-based care, digital innovation, and tackling health inequalities. If persistent pain after elective orthopaedic surgery is not addressed systematically, this vision risks being undermined. Conversely, if the pain and rehabilitation research community acts strategically, persistent pain could become a measurable marker of system performance and innovation.

This editorial outlines the intersections between the NHS 10-Year Health Plan, persistent pain, and elective orthopaedic surgery, and proposes a research and rehabilitation agenda that not only addresses current gaps but anticipates future opportunities.

Elective orthopaedics as a test case for system transformation

Elective orthopaedic surgery is a high-volume, high-visibility area of NHS activity. Joint replacement procedures are projected to rise significantly over the next decade due to population ageing, earlier surgical indications, and the recovery of the post-pandemic backlog. Persistent pain remains one of the most

common patient-reported adverse outcomes following total knee replacement (TKR) and total hip replacement (THR), with major consequences for health-related quality of life, function, productivity, and ongoing health service use (8, 9).

The NHS 10-Year Health Plan’s commitment to neighbourhood health services and integrated care systems (ICS) provides a unique platform to rethink surgical pathways from a linear episode of care to a learning, adaptive continuum. Persistent pain outcomes can serve as sentinel indicators for how well the system integrates surgical, rehabilitation and community-based pain services. In this sense, elective orthopaedics can act as an early proving ground for NHS reform.

Horizon scanning also points to increasing expectations for outcome transparency, real-time data reporting, and population-based outcome monitoring. Persistent pain rates after elective surgery may become central performance indicators, linked to commissioning, quality improvement and research investment.

Prevention and early intervention: reframing pain in elective surgery

The NHS plan prioritises early intervention to reduce long-term conditions and disability. In elective orthopaedics, this means intervening before pain becomes chronic. Evidence shows that targeted prehabilitation, psychological preparation, and risk stratification can reduce the likelihood of poor pain outcomes (6, 7).

A research-informed approach could include:

- Risk prediction models to identify high-risk patients pre-surgery using clinical, psychosocial and contextual indicators.
- Targeted interventions—such as psychologically informed rehabilitation—before and immediately after surgery.

- Stratified care to match intensity and content of rehabilitation to patient risk profiles.
- Monitoring transitions from acute to persistent pain using structured follow-up beyond discharge.

Looking ahead, emerging AI-based prediction tools, combined with linked registry data and patient-reported outcome measures (PROMs), could enable real-time risk stratification at scale. This would allow health systems to deploy early pain interventions in a targeted, resource-efficient way, transforming what is currently reactive care into proactive prevention.

Digital innovation: enabling scalable, personalised pain care

A core pillar of the NHS 10-Year Health Plan is the digital transformation of healthcare, including NHS App expansion, AI-driven triage, remote monitoring, and interoperable records. For elective orthopaedic surgery and persistent pain, this presents an opportunity to deliver hybrid care models—combining digital self-management with community-based rehabilitation.

Digital rehabilitation platforms, wearable technologies and patient dashboards can support personalised care trajectories and allow clinicians to detect deviations in pain recovery earlier (3).

Digital integration also enables the collection of large, longitudinal datasets that can inform predictive modelling, service design and population health planning.

Horizon scanning suggests that within the next decade, digital twins, virtual models of patient recovery, could support the personalisation of rehabilitation plans. Moreover, federated data infrastructures across NHS Trusts and ICSs will likely make it possible to monitor pain and function outcomes nationally, allowing earlier identification of unwarranted variation in postoperative pain trajectories.

Tackling inequalities in surgical pain outcomes

Health inequalities are a core priority of the NHS 10-Year Health Plan. Persistent pain after elective orthopaedic surgery is not distributed equally. Patients from deprived communities, ethnic minority groups and those with multimorbidity experience higher rates of persistent pain and lower access to rehabilitation services (5).

A forward-looking research agenda must:

- Integrate equity-focused metrics into surgical and rehabilitation pathways.
- Co-design interventions with underserved communities.
- Embed cultural competence, accessibility and flexibility into rehabilitation models.
- Monitor pain and functional outcomes across population subgroups.

Future NHS commissioning is likely to link funding to demonstrable reduction in inequalities. Persistent pain outcomes could be part of equity dashboards that guide resource allocation and hold systems accountable for delivering equitable recovery after elective surgery.

Implementation and evaluation: embedding research within service change

The NHS plan highlights learning health systems and continuous improvement as strategic levers. For pain and orthopaedics, research cannot remain external to service delivery, it must be embedded. Key opportunities include:

- Pragmatic and hybrid effectiveness—implementation trials of neighbourhood-based rehabilitation and pain services post-surgery.
- Routine data linkage to the National Joint Registry (NJR) and other population datasets.
- Incorporation of patient-reported pain trajectories into ICS dashboards.
- Rapid cycle evaluation frameworks to allow services to adapt and scale evidence-based models.

Horizon scanning also points to the growing role of real-world evidence in policy decisions. Over the next decade, NHS systems are expected to rely more on embedded evaluation, adaptive trials and data from service delivery rather than traditional RCTs alone.

To align persistent pain care in elective orthopaedics with the NHS 10-Year Health Plan and anticipate future system priorities, the research community should prioritise:

1. Prediction and Prevention – develop scalable, AI-enabled tools to identify and mitigate risk of persistent pain.
2. Digital Transformation – test and implement hybrid care models that blend digital rehabilitation with neighbourhood services.

3. Equity and Inclusion – embed health inequality reduction as a central outcome in pain research and service design.
4. Implementation Science – generate real-world, scalable evidence integrated with NHS data systems.
5. System Intelligence – use pain outcomes as sentinel metrics to track the impact of service transformation nationally.
6. Workforce Innovation – equip physiotherapists, pain specialists, and AHPs to work within digitally enabled, data-driven, neighbourhood-based rehabilitation models.

Conclusion

The NHS 10-Year Health Plan provides a once-in-a-generation opportunity to reimagine persistent pain care in elective orthopaedics. Joint replacement pathways offer a highly visible, data-rich, and scalable testbed for the system-wide ambitions of prevention, neighbourhood care, digital innovation and equity.

Horizon scanning suggests that over the next decade, persistent pain will move from being an under-recognised outcome to a core quality indicator, embedded in commissioning, service planning and clinical accountability. If research and rehabilitation communities engage proactively, they can shape these metrics, influence service design, and lead innovation. The challenge is clear: move from reactive pain management to predictive, preventive and personalised care, anchored in robust evidence and delivered at scale.

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