GID-HTE10069: Digital platforms to support rehabilitation before and after primary elective hip or knee replacement surgery

Final Protocol

Produced by: Peninsula Technology Assessment Group (PenTAG)
University of Exeter Medical School

Authors: Amanda Brand[1]

Ahmed Abdelsabour[1]

Alan Lovell[1]

Alex Allen[1]

Frank Grimsey Jones[1]

Ed Wilson[1]

[1]Peninsula Technology Assessment Group (PenTAG), University of Exeter Medical School, Exeter, UK

Correspondence to: Alan Lovell
3.09 South Cloisters, St Luke's Campus, Heavitree Road, Exeter, EX1 2LU; A.D.Lovell@exeter.ac.uk

Date completed: 08/12/2025

1. Decision problem

Table 1 summarises the decision problem to be addressed in this assessment. Further detail on each element can be found in the published scope for the assessment.

Table 1. Summary table of the decision problem

Item	Description	EAG comments
Population(s)	People listed for primary elective hip or knee replacement surgery.	Discussion at the scoping workshop suggested the population be limited to elective rather than emergency hip and knee replacements as preoperative rehabilitation (or 'prehabilitation') is not feasible in emergency situations.
Subgroups	If the evidence allows, the following subgroups may be considered: • People having total hip replacement versus total knee replacement (as recovery time differs) • People having total versus partial hip or knee replacement	Recovery time and cost of procedure differ between hip and knee. The EAG will differentiate between the two surgery sites in its analysis as far as is possible with the data available.
Intervention(s)	Digital platforms to support rehabilitation before and after hip or knee replacement surgery, including: • BPM Pathway (270 Vision Ltd) • ForPatientApp (B. Braun Medical Ltd), which incorporates an exercise module by Kemtai • getUBetter (getUBetter Ltd) • Good Boost (Good Boost Wellbeing Ltd) • GoWellHealth (SHI Global Ltd) • Huma (Huma Therapeutics Ltd) • Joint Academy (Artho Therapeutics AB) • moveUP (moveUP N.V.) • mymobility (Zimmer Biomet)	

	• myrecovery (HOPCo Ltd) • Phio: Phio Access, Phio Engage and Phio Collect (EQL Ltd) • Physitrack (Physitrack PLC) • PreActiv (Snow Squared Ltd) • QuestPrehab (C Digital Healthcare Ltd) • Slider (AI Rehab Ltd) • Sword Thrive (Sword Health) Only these listed technologies will be assessed	
Comparators	Self-directed rehabilitation before and after primary elective hip or knee replacement without digital platforms which includes: • Written or verbal advice, including exercise leaflets or links to exercise videos • In-person or telephone physiotherapy input, when available • Information resources, such as printed leaflets or web-based patient education	Comments to the EAG suggested implementation of prehabilitation varies substantially across the NHS. It is important to establish whether the digital tools represent a cost-effective alternative to no or limited prehab or as a cost-effective adjunct to full implementation of prehab, as the policy recommendations will differ based on this result. The EAG will therefore endeavour to include both a 'minimal prehab' arm and 'full implementation' arm as comparators. The comprehensiveness of this will be driven by data availability.
Setting	Outpatient care and community or home-based care	
Outcomes eligible for inclusion **(organised by outcome type)**	The outcome measures to consider include: **Primary outcomes** <u>Patient-reported outcomes:</u> • Health-related quality of life (e.g., EQ-5D, SF-12 or VR-12) • Pain and joint-specific function (e.g., OHS, OKS, HOOS-PS, KOOS-PS, KOOS, JR) • Meaningful function and participation in daily life, including return to usual activities, roles and	Given the large number of outcomes in the scope, the EAG will prioritise outcomes in consultation with NICE based on the availability of evidence. Where outcomes are reported at multiple time points, the EAG will extract data from the longest follow-up. If the evidence base is large, the EAG will prioritise the highest quality and most generalisable evidence

	independence (MSK-HQ functional items) • Confidence in recovery and self-management (e.g., Canadian Occupational Performance Measures, PAM-13, MSK-HQ self-efficacy items, Arthritis self-efficacy scale) <u>Clinical outcomes:</u> • Healthcare use: unplanned healthcare contacts or unplanned readmission • Escalation to face-to-face clinical review when concerns are identified • Mobility and functional performance tests where routinely collected (timed up and go, 30 second sit to stand, gait speed, range of motion) [Where comparator care if self-directed rehabilitation, in-person tests may only be collected at routine postoperative review or before discharge] **Secondary outcomes** <u>Patient-reported outcomes:</u> • Psychological outcomes (anxiety or wellbeing measures where collected) • User satisfaction and acceptability (of the technology to support recovery) • Return to usual activities (return to work or caring responsibilities) <u>Intermediate outcomes:</u> • Intervention adherence, completion of exercises or recommended activities • Interaction with healthcare professionals, messaging or education engagement • Early identification of concerns, including digital red-flag alerts that trigger clinical triage	(RCTs, UK studies, largest sample sizes and longest follow-up). Because of its importance for modelling, the EAG will include 'post-operative recovery time or length of in-patient stay' as a clinical outcome.

	• Intervention-related adverse events (including falls during exercise, device- or sensor-related issues, failure of red-flag mechanisms)
	<u>Cost and resource use:</u>
	• Cost of the technologies (including license fees and maintenance)
	• Cost related to supporting digital technologies (including but not limited to additional hardware or software, cost of staffing and training)
	• Costs related to length of rehabilitation before and after surgery
	• Cost of resource use
	  ○ Primary, community and secondary care appointments
	  ○ Surgical team follow-up
	  ○ Physiotherapy or multidisciplinary review
	• Length of treatment or rehabilitation period before and after surgery	

Economic analysis	A decision analytic model will be developed and comprise a cost-utility or cost-comparison analysis. Costs will be considered from an NHS and Personal Social Services perspective. Sensitivity and scenario analysis should be undertaken to address the relative effect of parameter or structural uncertainty on results. The time horizon should be long enough to reflect all important differences in costs or outcomes between the technologies being compared.	The EAG anticipates the major drivers of cost-effectiveness to be shortened length of stay with relatively small quality of life gains for patients. The EAG will consider a CUA or CMA approach, depending on which captures the costs and benefits in the most appropriate way.

Abbreviations: CMA, cost minimisation analysis; EAG, evidence assessment group; EQ-5D, EuroQol five-dimensional questionnaire; HOOS-PS, Hip disability and Osteoarthritis Outcome Score-Physical Function Short-form; KOOS, JR, Knee injury and Osteoarthritis Outcome Score for Joint Replacement; KOOS-PS, Knee injury and Osteoarthritis Outcome Score-Physical Function Short-form; MSK-HQ, Musculoskeletal Health Questionnaire; NHS; National Health Service; OHS, Oxford Hip Score; OKS, Oxford Knee Score; SF-12, Short Form 12-item Health Survey; PAM-13, Patient Activation Measure 13-item questionnaire; QoL, quality of life; RCT, randomised controlled trial; VR-12, Veterans Rand 12-item Health Survey

1.1 Objectives

The purpose of the early use assessment (EUA) is to summarise and critically appraise existing evidence on the clinical effectiveness and cost-effectiveness of digital platforms to support rehabilitation before and after hip or knee replacement surgery. A review will be conducted to identify relevant evidence for the included interventions in the target population. A simple *de novo* economic model will also be developed to explore the potential cost-effectiveness of the included interventions.

The objectives of this project are:

Clinical Effectiveness

- Identify and assess evidence relating to the use and clinical effectiveness of the included technologies as it pertains to the scope
- Report on any potential safety issues
- Report the evidence gaps, highlighting what data may need to be collected to inform these gaps

Cost-Effectiveness

- Identify and assess economic evidence relating to the use of the included technologies within the scope
- Subject to sufficient evidence, develop a conceptual economic model related to the scope, that can be used to inform future research and data collection
- Report available model inputs and evidence gaps
- Report key areas of uncertainty, their potential implications for decision-making and test the impact of alternative plausible assumptions
- Report on the technologies' costs and effects, and an early assessment of whether there is a case, based on current evidence, for their use to be a cost-effective alternative to standard care in the NHS.

2. Evidence review methods

A review to identify evidence for the clinical and cost-effectiveness of included interventions will be undertaken following the general principles published by the

Centre for Reviews and Dissemination (CRD) at the University of York.[1] A systematic literature review (SLR) to comprehensively search for all relevant evidence for the appraisal is beyond the scope of an EUA.[2] However, the best available rapid review methodology will be used to produce a robust overview of the relevant literature, with systematic literature searches and evidence synthesis conducted in a rigorous and transparent manner.

Based on initial scoping searches, the EAG does not expect there to be a large body of evidence for the included technologies. However, if the evidence base identified is large, the EAG will prioritise the inclusion of evidence.

2.1 Inclusion criteria

Table 2. Inclusion and exclusion criteria

	Inclusion Criteria	**Exclusion Criteria**
Population	As in Table 1	Emergency surgeries (e.g. fractures and revision surgery)
Intervention	As in Table 1	Technologies that do not support rehabilitation before and after knee or hip replacement, offer only educational content, exercise libraries without monitoring or feedback, or general wellness applications will not be included.
Comparators	As in Table 1	
Setting	As in Table 1	
Outcomes	As in Table 1, with the addition of 'post-operative recovery time or length of in-patient stay' as a clinical outcome	
Study design	Any of the following, in descending order of preference: • Randomised controlled trials • Prospective controlled studies • Retrospective controlled studies • Single-arm studies	

	Systematic reviews themselves will be excluded and only their included primary studies will be considered for eligibility.	

2.2 Search strategy

Search strategies will be developed to identify evidence relevant to the decision problem. Strategies will be based on the initial scoping searches done by the NICE information services team, with further search terms identified through discussion within the PenTAG review team and by scanning background literature and key articles.

Search strategies will first be developed in MEDLINE and then modified and adapted as necessary for each database. Searches will be limited to English but not limited by study design.

The EAG will search the following sources:

- MEDLINE (Ovid)
- Embase (Ovid)
- Cochrane Central Register of Controlled Clinical Trials (CENTRAL) (Cochrane Library)
- Cochrane Database of Systematic Reviews (Cochrane Library)
- CEA Registry (Tufts)
- The WHO International Clinical Trials Registry Platform (ICTRP)
- The US National Library of Medicines registry (Clinicaltrials.gov)
- Medicines and Healthcare products Regulatory Agency (MHRA) field safety notices and the Manufacturer and User Facility Device Experience (MAUDE) database will be searched for adverse events.
- Relevant clinical guidelines from NICE, Scottish Intercollegiate Guidelines Network (SIGN) and International Network of Agencies for Health Technology Assessment (INAHTA)
- Manufacturer websites

An exemplar search strategy for MEDLINE (Ovid) is provided in Appendix 1.

Documents provided by companies will be examined and relevant studies not identified by the EAG searches added to full text screening. Manufacturer submissions, as well as any relevant systematic reviews identified by the search strategy, will also be scrutinised to identify additional relevant studies. Conference proceedings will be included in searches in Embase and CENTRAL.

In addition to the above searches, a targeted search of the broader literature on people requiring, or having undergone, hip or knee replacement surgery will be undertaken to identify the evidence base on health-related quality of life (HRQoL), resource use and costs for treatment, and the methods available for the modelling of cost-effectiveness analyses.

2.3 Study selection

The EAG propose to use the AI Copilot functionality in easySLR[3] to support screening and data extraction. The purpose of the use of AI is to speed up the early review steps and augment, rather than replace, human involvement. Humans will stay in the loop throughout, and every sifting decision or data extracted by the AI tool will be checked and reviewed by a human. All responsibility for sifting and data extraction decisions will remain with PenTAG.

The first 10% of titles and abstracts will be sifted independently and in duplicate by two human reviewers. During the title and abstract sift, the EAG will include all records reporting on any digital platforms supporting prehabilitation or rehabilitation following knee or hip replacement in an eligible population, unless it is explicitly reporting an out-of-scope technology. This inclusive approach is necessary as names of technologies are often not reported in the title and abstract. This approach will help ensure the EAG identify all relevant literature to inform both the clinical and economic assessment.

After the 10% sift, the two human reviewers will discuss any conflicts, drawing in the full review team as necessary. Once agreement has been reached for all records, the EAG will prompt AI Copilot in easySLR of the necessary inclusion and exclusion criteria. The remaining 90% of title and abstract records will then be double screened

by one human review and the AI reviewer. All conflicts will be reviewed by the first reviewer, in discussion with a second human reviewer where appropriate.

Full publications of potentially relevant studies will be obtained and examined by one human reviewer and AI Copilot as a second reviewer (with the first 10% assessed by a second human reviewer) to identify relevant clinical and economic studies. The EAG will limit clinical studies to only those of the interventions listed in the final scope and meeting the full inclusion criteria (as set out in Table 2). Relevant economic evaluations of any digital platform supporting pre- and rehabilitation following knee or hip replacement (whether in or out of scope) will be considered.

The EAG will consider data submitted by companies or other stakeholders prior to the date stipulated in section 5 of the protocol (Handling information from companies and other stakeholders). Any unpublished evidence will be handled according to the NICE HealthTech programme manual (2025).[2] Briefly, unpublished evidence should be accompanied by sufficient details to enable a judgment as to whether it meets the same standards as published evidence and to determine potential sources of bias. Ideally, it should be structured and presented in the form of a research publication.

2.4 Data extraction strategy

Data will be extracted from included studies into a piloted database by one reviewer (with the first 10% checked by a second reviewer) with the help of easySLR. AI Copilot will be used in this step to generate suggestions for the data extraction form, with PenTAG retaining full oversight and responsibility for data extraction. Extracted data will include information about the study reference and its design, population and intervention characteristics, and relevant outcomes.

If the evidence base identified is large, the EAG will prioritise the inclusion of RCTs and studies done in the UK, as the most generalisable to the NHS, as well as those with larger sample sizes and with longer follow-up. The EAG will prioritise outcomes in consultation with NICE based on the availability of evidence. Where data on the same outcome are reported at multiple time points, it will be extracted at the longest follow-up.

2.5 Quality assessment strategy

Formal risk of bias will not be conducted as this is not required for EUA.[2] However, the EAG report will include a discussion around potential biases in key studies and how these biases might affect key outcomes. The report will explicitly detail potential sources of bias, such as main confounding factors, and will comment on the generalisability of the results to clinical practice in the NHS.

2.6 Methods of synthesis and analysis

Clinical data will be presented by outcome and tabulated and narratively synthesised. If feasible, reporting will additionally be grouped by the level of professional involvement in the intervention.

Methods and findings from included economic evaluations will be summarised in a tabular format and synthesised narratively. Economic evaluations carried out from the perspective of the UK NHS and Personal Social Services (PSS) will be presented in greater detail.

3. Economic analysis methods

The primary purpose of the economic analysis is to assess whether there is a *prima facie* case or 'early signal' that digital platforms to support rehabilitation before and after hip or knee replacement surgery might plausibly be cost-effective interventions when used alongside standard care. The secondary purpose of the analysis is to identify and understand factors that are likely key drivers of the results. For these purposes, a simple cost-utility or cost-comparison model with a time horizon long enough to reflect all important differences in costs and outcomes will be developed, if data allow. Clinical expert opinion (from NICE appointed experts) will be sought to assess the face validity of the model structure, inputs and assumptions.

Finally, the EAG report will highlight current evidence gaps and describe the value of future evidence generation.

3.1 Model development

It is anticipated that existing economic evaluations with a similar scope is likely to be sparse and that *de novo* model development will be needed. Using available

evidence, if data allow, and following good-practice guidance for the conduct and reporting of decision analytical modelling in HTA,[4-6] a cost-utility or cost-comparison model will be developed to estimate resource use, costs and quality-adjusted life years (QALYs) across different treatment arms, using a 12-month time horizon as it's expected to capture the meaningful differences in costs and outcomes. Potential longer-term benefits are likely very uncertain, and the EAG do not expect it will be possible to robustly estimate them from the available evidence.

The EAG considers that the interventions are likely to only impact recovery times and short term HRQoL, not survival, and therefore either a cost-utility analysis (CUA) or cost-minimisation analysis (CMA) may be appropriate (depending on the relative magnitude of these benefits). Should evidence or clinical expert advice suggest that the interventions may influence longer-term outcomes, the EAG will test this in a scenario analysis incorporating a longer time horizon.

Cost-effectiveness will be evaluated against a threshold of £20,000/QALY, in line with NICE's reference case (or simple comparison of costs if cost-minimisation analysis).[4] Costs will be considered from an NHS and PSS perspective,[2] and may include:

- Costs of the technologies (including license fees and maintenance)
- Cost related to supporting digital technologies (including but not limited to additional hardware or software, cost of staffing and training)
- NHS and social services costs related to length of rehabilitation before and after surgery
- Primary, community and secondary care appointments
- Surgical-team follow-up
- Physiotherapy or multidisciplinary review

If data do not allow for economic modelling, the EAG will describe the appropriate characteristics of the model that would be required (e.g. structure, setting, input parameters and ideal data sources).

The model structure will be determined based on research evidence and clinical expert advice from NICE appointed experts around appropriate assumptions, particularly in the case where:

- no suitable data are identified for effectiveness for some of the interventions
- there are data gaps in the information available to populate resource use or quality of life information per health state.

All assumptions applied in the modelling framework will be clearly stated and all data inputs, as well as data sources, will be clearly identified.

3.2 Conceptual modelling

A decision analytic model will be developed in Microsoft Excel. Patients will be allocated to either the intervention arms (digital technology) or to the comparator (standard care) and will progress through the model accordingly. The intervention pathway will incorporate a node capturing patient uptake and adherence (or engagement) with the digital technology.

Outcomes will only be included in the model where there is an expected difference in either the rates or the scale of impact on cost and recovery, or HRQoL.

Where appropriate and if data allow, sensitivity analyses will be undertaken to explore uncertainty. These may include one-way and multi-way sensitivity analyses and use of probabilistic sensitivity analyses (PSA).

The EAG will consult clinical experts to assess the face validity of the final model and the results.

3.3 Modelling considerations

The EAG expects to model hip and knee replacement separately, as clinical experts consulted during scoping indicated that recovery trajectories, support needs, and NHS resource use differ substantially between the two procedures.

People with lived experience also highlighted that travelling to attend face-to-face physiotherapy after surgery (especially when mobility is impaired) imposes a considerable logistical and out-of-pocket burden. Digital rehabilitation was viewed as

a potentially valuable alternative. Therefore, if suitable data are available, the EAG will include a scenario analysis that incorporates patient out-of-pocket costs for transportation for the proportion of patients who use face-to-face or group physiotherapy in current standard of care.

Based on the scoping discussions with clinical experts and preliminary review of the literature, the EAG considers it unlikely that digital platforms would differ from current standard care in terms of long-term clinical outcomes (i.e. no differences are anticipated in implant longevity, the risk of revision surgery, or the incidence of major post-operative complications such as infection). Accordingly, the EAG will assume these long-term outcomes to be equivalent across both arms in the economic model, unless the evidence suggests otherwise.

The EAG heard from clinical experts during the scoping session that there is some variation in what is considered standard care. Therefore, subject to data availability, the EAG will include two ‘treatment as usual’ comparators: one comprising a ‘gold standard’ carefully adhering to relevant guidelines, and another comprising current practice as delivered in the NHS.

The EAG also recognises that digital technologies may vary considerably in their features and the level of professional involvement offered (e.g., access to a company physiotherapist, integrated medical devices, AI-enabled functions, or minimal/no professional input). Such variation can influence costs, implementation requirements, and patients' engagement with the technology. So, if data permits, the EAG will explore this by distinguishing between platforms based on features through scenario analysis to assess the potential impact on cost-effectiveness.

The base case will include the cost of any equipment required to ensure that patients are not disadvantaged by needing to provide their own devices.

3.4 Cost of reversing a decision

The EAG anticipates no meaningful costs associated with reversing a future decision in this context. This assumption will be discussed with clinical experts to ensure it is appropriate. In case reversal costs might arise (e.g., if the NHS were to enter long-term contractual arrangements for a specific platform), the costs of reversing the

decision will be explored and incorporated in scenario analysis and discussed accordingly.

4. Evidence gaps analysis

Evidence gaps identified pertaining to the intermediate and final outcomes from the scope and those pertaining to the economic modelling will be summarised in tabular and narrative form.

A table will be produced that indicates the nature of the gap using the following 'traffic light' scheme:

- Red indicating no comparative evidence for the scoped population
- Amber indicating weak comparative evidence for the scoped population
- Green indicating robust comparative evidence for the scoped population

5. Handling information from the companies and other stakeholders

All data submitted by the companies in evidence and information requests by NICE, or data submitted by other stakeholders, will be considered by the EAG if received by 9 January 2026. Information arriving after this date will not be considered. If the data included in the information provided meet the inclusion criteria for the review, they will be extracted and quality assessed following the procedures outlined in this protocol. The EAG may seek clarification or additional information from companies and other stakeholders where necessary. All correspondence between the EAG and companies will happen through NICE.

Any 'commercial in confidence' data provided by a company and specified as such will be highlighted in blue and underlined in the assessment report. Any 'academic in confidence' data provided by company(s), and specified as such, will be highlighted in yellow and underlined in the assessment report. If confidential information is included in the economic model, the EAG will provide a copy of the model with 'dummy variable values' for the confidential values (using non-confidential values).

6. Competing interests of authors

The authors declare no competing interests.

7. References

1. Centre for Reviews and Dissemination (CRD). Systematic Reviews: CRD's guidance for undertaking reviews in health care. York: University of York; 2009. Available from: https://www.york.ac.uk/media/crd/Systematic_Reviews.pdf.

2. National Institute for Health and Care Excellence (NICE). NICE HealthTech programme manual. NICE process and methods. PMG48. London: NICE; 2025 [updated 23 October 2025]. Available from: https://www.nice.org.uk/process/pmg48/.

3. easySLR™. Gurugram, HR: Simplify SLR Private Limited; 2025. Available from: https://www.easyslr.com/.

4. National Institute for Health and Care Excellence (NICE). NICE health technology evaluations: the manual. NICE process and methods. PMG36. London: NICE; 2022 [updated 23 October 2025]. Available from: https://www.nice.org.uk/process/pmg36/.

5. Briggs A, Claxton K, Sculpher M. Decision Modelling For Health Economic Evaluation. Oxford: Oxford University Press; 2006.

6. Husereau D, Drummond M, Augustovski F, de Bekker-Grob E, Briggs AH, Carswell C, et al. Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) Statement: Updated Reporting Guidance for Health Economic Evaluations. Value Health. 2022;25(1):3-9.

Appendix A: Draft search strategy

Database(s): **Ovid MEDLINE(R) ALL** 1946 to December 05, 2025
Search Strategy:

#	Searches	Results
1	("BPM Pathway" or BPMpathway).ti,ab,kw,in,ci.	4
2	ForPatientApp.ti,ab,kw,in,ci.	0
3	Kemtai.ti,ab,kw,in,ci.	0
4	getUBetter.ti,ab,kw,in,ci.	2
5	"Good Boost".ti,ab,kw,in,ci.	10
6	GoWellHealth.ti,ab,kw,in,ci.	0
7	huma.ti,ab,kw,in,ci.	2209
8	"joint academy".ti,ab,kw,in,ci.	574
9	moveUP.ti,ab,kw,in,ci.	15
10	mymobility.ti,ab,kw,in,ci.	6
11	Myrecovery.ti,ab,kw,in,ci.	1
12	Phio.ti,ab,kw,in,ci.	239
13	Physitrack.ti,ab,kw,in,ci.	10
14	PreActiv.ti,ab,kw,in,ci.	0
15	QuestPrehab.ti,ab,kw,in,ci.	2
16	Slider.ti,ab,kw,in,ci.	1147
17	"Sword Thrive".ti,ab,kw,in,ci.	0
18	or/1-17	4219
19	"270 Vision".ti,ab,kw,in,ci.	1
20	Braun.ti,ab,kw,in,ci.	21672
21	"SHI Global".ti,ab,kw,in,ci.	2
22	"Artho Therapeutics".ti,ab,kw,in,ci.	0
23	"Zimmer Biomet".ti,ab,kw,in,ci.	2716
24	HOPCo.ti,ab,kw,in,ci.	9
25	EQL.ti,ab,kw,in,ci.	35
26	"Snow Squared".ti,ab,kw,in,ci.	0
27	"C Digital Healthcare".ti,ab,kw,in,ci.	0
28	"AI Rehab".ti,ab,kw,in,ci.	17
29	"Sword Health".ti,ab,kw,in,ci.	50
30	or/19-29	24450
31	osteoarthritis/ or hip osteoarthritis/ or knee osteoarthritis/	87283
32	exp knee replacement/ or exp hip replacement/ or arthroplasty/	10493
33	(gonarthrosi* or coxarthrosi*).ti,ab.	2810
34	((hip* or knee*) adj3 (osteoarthr* or arthroplast* or surg* or replace* or operation* or operate*)).ti,ab,kw.	140182
35	or/31-34	197921

36	exp "Physical and Rehabilitation Medicine"/ or Preoperative Exercise/ or physical therapy modalities/	94269
37	(rehab* or prehab*).ti,ab,kw.	264797
38	((before* or after* or pre* or post*) adj5 (surg* or replace* or operat*) adj5 (physio* or physical-therap* or exercis* or strength* or mobilit* or train*)).ti,ab,kw.	14369
39	or/36-38	326285
40	35 and 39	10998
41	Mobile Applications/	16188
42	exp Internet/	109510
43	exp Cell Phone/	27111
44	exp Computers, Handheld/	16588
45	Medical Informatics Applications/	2556
46	Therapy, Computer-Assisted/	7071
47	(app or apps).ti,ab.	56787
48	(online or web or internet or digital*).ti.	174361
49	((online or web or internet or digital*) adj3 (based or application* or intervention* or program* or therap*)).ab.	102326
50	(phone* or telephone* or smartphone* or cellphone* or smartwatch*).ti.	32521
51	((phone* or telephone* or smartphone* or cellphone* or smartwatch*) adj3 (based or application* or intervention* or program* or therap*)).ab.	21779
52	(mobile health or mhealth or m-health or ehealth or e-health or emental or e-mental).ti.	11161
53	((mobile health or mhealth or m-health or ehealth or e-health or emental or e-mental) adj3 (based or application* or intervention* or program* or therap*)).ab.	8194
54	(mobile* adj3 (based or application* or intervention* or device* or technolog*)).ti,ab.	29018
55	or/41-54	422240
56	40 and 55	363
57	30 and 40	68
58	18 and 35	51
59	or/56-58	460