Supplementary Material 1. EHR Variable to Quality Indicator Framework Mapping

EHR Variable	Donabedian Domain	Braybrooke Theme(s) [16]	Supporting Named QI(s)	Braybrooke Draft Indicator [16]	Chiropractic QM(s) [24]	Notes
Treatments to Release (TTR) by body region	Outcome	Theme C: Optimising Patient Outcomes Subtheme: Achievement of rehabilitation goals and outcome of treatment	1. "As a result of the rehabilitation period, have you achieved one or several goals that are important to you?" [18]	% of patients who report having achieved at least one of their goals relating to their MSK condition during their time working with the MSK service	1. Return to work time: "Return to work time for patients with a work-related injury" 2. Response to care: "Percentage of patients whose response to care is regularly assessed" 3. Outcome assessment (re-evaluation): "Percentage of patients assessed during a re-evaluation using a valid functional and/or symptom outcome measure"	Across all three frameworks, episode duration maps to the outcome domain. TTR is a clinician-recorded administrative proxy for the patient-reported goal achievement and functional change QIs in Braybrooke Theme C [16], and for Kleppe et al. [24] response to care and outcome assessment QMs. Kleppe recommends QMs be obtained from administrative data to avoid auditor bias and inadequate sample sizes; TTR demonstrates this is feasible from structured EHR fields. Braybrooke draft indicators are patient-reported and Kleppe et al. [24] outcome QMs rely on validated instruments. TTR is a clinician-recorded proxy, equivalent as a measure of episode completion but methodologically distinct from both.
Recurrence (Reopened care plans)	Outcome (& Process implications)	Theme C: Optimising Patient Outcomes Theme B: Optimising Patient Education & Self-Management Subtheme C: Achievement of rehabilitation goals and outcome of treatment Subtheme B: Likely symptoms, clinical course, and flare/recurrence management	1. Theme C - Outcome: "As a result of the rehabilitation period, have you achieved one or several goals that are important to you?" [18] 2. Theme B - Process: "Information regarding knowledge, understanding and possible consequences of progression of condition" [19]	Theme C: % of patients who report having achieved at least one of their goals relating to their MSK condition Theme B: % of patients who have a recorded discussion around the likely clinical course of their MSK condition	1. Additional care assessment: "Percentage of visits where the need for additional visits is assessed" 2. Response to care: "Percentage of patients whose response to care is regularly assessed" 3. Current care plans: "Percentage of visits with a current care plan"	Recurrence rate as an outcome metric is absent from both the Braybrooke [16] and Kleppe [24] frameworks. Braybrooke addresses recurrence prevention as a process QI. Kleppe addresses whether care plans are current and whether additional visits are assessed, recognising that continual review is optimal, but contains no QM measuring whether care plans reopen. Recurrence rate as a measurable outcome is therefore a gap in both frameworks. The Donabedian outcome domain framing is appropriate, stating "reopened care plan rate is a downstream outcome reflecting whether initial resolution was durable."
Mechanism of Injury (5 subcategories: repetitive overuse, exertional, static/postural, traumatic, nothing specific)	Process	Theme A: Optimising Assessment and Diagnosis Subtheme: Reason for appointment, clinical course and need	1. Reason for appointment subtheme: "Cause/Source of pain: Aetiology, location/site, and/or diagnosis contributing to pain" (widespread/multisite) [21] 2. Reason for appointment subtheme: "History Taking: Assessment of neck pain course" (neck pain) [20]	% of patients who have had their clinical course assessed (including pain course and aggravating and easing factors)	1. Condition-specific history: "Percentage of patients with documented condition-specific history prior to initiating care" (rationale lists symptom onset, location, duration, progression, recurrence, variation, severity, and activity limitations) 2. Health history: "Percentage of patients with documented past health history prior to initiating care"	Mechanism of injury coding sits in the Donabedian process domain and the Braybrooke "Reason for appointment, clinical course and need" subtheme. Against Kleppe, mechanism coding operationalises condition-specific history. This was the highest-rated process QM for importance (4.79/5), ranked first for importance but third for feasibility (4.55/5).

Obstacles to Recovery (Multiple categories, ~90 factors; psychosocial, owork beliefs, job and workplace culture, health history, injury details, outside work activities)	Process	Theme A: Optimising Assessment and Diagnosis Theme D: Optimising Personalised Care Subtheme A: Assess barriers and facilitators to treatment Subtheme A: Mental and Social Wellbeing Assessment Subtheme D: Individualised Treatment	1. Theme A - barriers subtheme: "The physiotherapist should assess barriers and facilitators for PT treatment" (hip/knee OA) [19] 2. Theme A - barriers subtheme: "Assessing the presence of personal and environmental problems insofar as these relate to limitation in activities and restrictions in participation" (hip/knee OA) [19] 3. Theme A - Comprehensive assessment including psychological wellbeing, social/work needs, and comorbidities (all MSK) [22] 4. Theme A - mental/social wellbeing subtheme: "Did a physiotherapist ask if you are feeling anxious, stressed, down, depressed, and/or lost interest in activities?" [23]	Theme A: % of patients who have barriers and facilitators of treatment assessed Theme D: % of patients that have evidence of an individualised treatment plan tailored to their needs, preferences, and goals	1. Psychosocial risk factor screening: "Percentage of patients assessed for psychological and social risk factors for poor outcome and/or chronicity" Rationale: "Screening is a process designed to help identify relevant psychological and social factors that can negatively influence a person's capacity to improve so they can be subsequently addressed." 2. Multimodal care plans: includes self-management advice addressing factors influencing symptoms, obstacle documentation directly informs this QM Structural companion: Psychosocial risk factor intervention infrastructure: "Screening for meaningful psychosocial risk factors is not useful if needs are not addressed"	The obstacle structure relates to the Braybrooke barriers assessment QI (Theme A) and feeds the individualised treatment QI (Theme D). The psychosocial subcategory maps to the Braybrooke mental and social wellbeing assessment subtheme and to Kleppe et al. [24] psychosocial risk factor screening QM. Kleppe et al. [24] national survey rated psychosocial risk factor screening the lowest QM for feasibility (3.31/5) and second lowest for importance (3.52/5) among US chiropractors. This reflects a profession-wide knowledge gap in psychosocial assessment documented in the MSK literature [39, 40]. Clinicians cannot document what they have not assessed, and cannot assess what they do not recognise as clinically relevant. Structured EHR data can quantify the extent of this gap at clinician and organizational level.
Prognosis Accuracy (expected vs actual TTR; clinician estimate at first visit)	Process	Theme A: Optimising Assessment and Diagnosis Theme D: Optimising Personalised Care Subtheme A: Monitoring the adverse effects of treatment over time Subtheme D:Goal Setting / Individualised Treatment	1. Theme A - monitoring subtheme: "Indication of treatment prognosis" (neck pain) [20] 2. Theme A - monitoring subtheme: "Number of sessions in agreement with prognosis" (neck pain) [20] 3. Theme A - re-assess subtheme: "Reassessment: Evaluation of the effectiveness of current treatment plan/pain care" (widespread/multisite0 [21] 4. Theme D - goal setting subtheme: "Based on clinical reasoning and shared decision making, the physiotherapist should set specific, measurable, attainable, result-orientated and timely (SMART) treatment goals" [hip/knee OA) [19] 5. Theme D - goal setting subtheme: "Treatment plan and goals in agreement with patients' health profiles" (neck pain) [20]	Theme A: % of long-term patients who have evidence of monitoring of their MSK condition over time Theme D: % of patients who have evidence of goals set that are in line with their management plan	1. Response to care: "Percentage of patients whose response to care is regularly assessed" (companion monitoring mechanism to prognosis) 2. Additional care assessment: "Percentage of visits where the need for additional visits is assessed" (relates to whether prognosis is being reviewed) 3. Care plans based on clinical evaluation: "Percentage of care plans based on a clinical evaluation" (prognosis is the documented expected care plan length)	No validated QI in either the Braybrooke or Kleepe framework measures the accuracy of initial prognosis estimates against actual outcomes.This is reasonable and reflects the nature of the clinical journey, where more information is revealed as examination and trust is built with patients. Braybrooke requires prognosis to be documented and sessions to align with it, but does not specify measurement of accuracy. Kleppe requires care plans to be based on clinical evaluations (importance 4.69/5) and response to be regularly assessed (importance 4.62/5), but does not address whether the initial estimate was accurate, which as a quality metric, could provide learning opportunties. Prognosis accuracy against actual outcomes is therefore a gap in both frameworks. The Braybrooke draft indicator ("% of long-term patients with evidence of monitoring over time") and Kleppe care plan QMs are the closest anchors but address documentation and monitoring rather than accuracy. In the Donabedian framework this sits in the process domain: the accuracy of the initial clinical estimate is a process quality issue with direct implications for goal-setting and personalised