Orthopathways: Draft Analysis schedule/tables (23.9.24)

Analysis 1

Comparison of baseline intervention versus control characteristics: including practice and patient demography, pain location and pain intensity (as is available)
Number (%) of MSK patients who were reviewed by orthopathways software: overall and split by GP practice.
Comparison of baseline demography, pain location and pain intensity for intervention patients who completed received orthpathway versus did not receive orthopathway: overall and split by intervention practices (and versus control)

- Establish potential covariates for use in below analysis / and for 'matching' in primary analysis

Table 1: Baseline comparison of study groups (to be refined when available data is known)

	Intervention (All)	Intervention (subgroup reviewed by Orthopathways)	Control (All)
Age, mean (SD)			
Sex, n (%)			
Males			
Females			
Pain location, n (%)			
Back			
Neck			
Shoulder…			
Pain intensity, mean (SD)			

Table 1.1: Comparison of (relevant/available) baseline characteristics split by intervention/control and GP practice

Analysis 2

Sample size of 200 in the intervention and 200 in the control group (400 in total) obtained by sampling 10 clusters with 20 subjects in each arm, achieves at least 90% power to detect a difference in prescribing/referral for any of the above modalities between the group proportions of 0.2 with an assumed intracluster correlation of 0.01 (with coefficient of variation in cluster sizes of 0.65), and using a two-tailed 5% significance level

Variables of interest from the index consultation will include: date of consultation, coded reason for the consultation, index pain intensity and location, and information about the treatments/ actions provided by the clinician. Clinician behaviour variables =

- referrals to secondary care/ other services (e.g. to physiotherapy and secondary care specialists)
- referrals/signposting to social prescribing/community non-medical services (e.g., weight loss services)
- mental health assessment and referrals to services
- prescribing (of simple analgesics, weak opioids, strong opioids, anti-inflammatories, muscle relaxants, neuro-modulators, corticosteroid injections)
- referrals to physiotherapy or muscular-interface clinics, specialist orthopaedics, pain clinics, rheumatology
- referral for investigations / imaging requests (e.g. for radiographs, MRI/CT scans, body density scans, blood tests)
- provision of advice/exercises
- self-management support including use of digital technologies such as "GetUBetter"

- repeat primary care visits (any further musculoskeletal related GP consultations)
- sick certification/ fit notes

(note: identification EHR codes are required for the above variables)

Compare behaviour variables for:
Intervention versus Control [adjusting for covariates] – Intention to Treat
Intervention (orthpathways selected) versus Control [adjusting for covariates] – Per Protocol {main analysis}

Hierarchical (multi-level) generalised linear regression models (including modelling for binary/count data) will be carried out for evaluating between-group difference of all prescribing modalities adjusting for GP Practice list size (fixed effects) and taking account clustering by GP Practice (random effects) … and to include potential covariates (as observed in analysis 1)

Table 2.1: Comparison of GP decision-making per arm (0-90 days) taken from the anonymised electronic medical record audit {evaluating count data}

	All intervention (1)	**Subgroup using orthopathways (2)**	**Control (3)**	**ITT comparison (1/3)**	**PP comparison (2/3)**
	All patients (n=xxx)	All patients (n=xxx)	All patients (n=xxx)	IRR (95% CI)	IRR (95% CI)
Prescription, count (mean per patient)					
Simple analgesics					
Anti-inflammatories					
Neuromodulators					
Muscle relaxants					
Weak opioids					
Strong opioids					
Corticosteroid injection					
Referral, count (mean per patient)					
Physiotherapy or Musculoskeletal interface clinic					
Specialist orthopaedics					
Pain clinic					
Social prescribing / community non-medical services (e.g. weight loss services)					
Mental Health services					
Rheumatology					
Neurology					
Podiatry					
Imaging, count (mean per patient)					
X-ray or MRI for musculoskeletal disorder					
Ultrasound scan for musculoskeletal disorder					

	Bone density scan					
	Blood tests					
Nerve conduction study						
Provision of advice/exercises, count (mean per patient)						
Self-management support including use of digital technologies such as "GetUBetter", count (mean per patient)						
Sick/fit-note certification, count (mean per patient)						
Repeat Musculoskeletal GP consultations over 3 months, count (mean per patient)						

Note: Grey (highlighted) rows are additional rows added to those provided in TAPS analysis

Statistical testing was carried out by negative binomial mixed model with practice (random factor) and practice size .. and other possible covariates (fixed factors) for count data, except where logistic mixed modelling with the same fixed/random factors was used instead (for binary data, or due to lack of model convergence and/or small counts). Ratios are for Intervention relative to Control. Statistically significant p-values ($p<0.05$) are to be bolded.

Table 2.2: Same as above – Table 2.1 {except evaluating as number (%) of participants with analysis by logistic mixed models}

Analysis 3

Specifically, for the 'appropriateness' evaluation (by blinded reviewers) we will use a sub-sample of 120 of the anticipated 400 patients [60 intervention / 60 control purposively sampled in roughly even numbers across all participating GP practices (match on specific covariates)] which will respectively give approximately 80% power to detect a difference in appropriateness of decision-making between the group proportions of 0.25 with an assumed intracluster correlation of 0.01

Hierarchical (multi-level) generalised linear regression models (expectedly using logit link function for binary outcome data) will be used adjusting for GP Practice list size (fixed effects) and taking account clustering by GP Practice (random effects) for the primary analysis of between-group testing and estimation of mean difference in 'appropriateness of health care' at 3 months.

Table 3: Comparison of matched groups for 'appropriateness of care'

	Intervention (1)	**Control (2)**	**OR***	**OR****
	(n=60)	(n=60)	(95% CI)	(95% CI)
Given appropriate care, n (%)				
			P=???	P=???

* main analysis ** sensitivity analysis (adjusting for additional covariates)

Statistical testing was carried out by logistic mixed model with practice (random factor) and practice size (** and other possible covariates). Odds Ratios are for Intervention relative to Control.

Focus of evaluation (analyses 2 and 3 above) will be on superiority with testing against two-sided 5% alpha and including 95% confidence intervals.

Analysis 4

Health economic analysis to evaluate the potential costs and benefits of the intervention over control group (unclear if this is York or ourselves carrying out this evaluation)?!

Analysis 5 – Carbon reduction evaluation

By York collaborators