

Supplementary Digital Content

Table S1: British National Formulary (BNF) codes used to identify individuals in receipt of prescribed medication for analgesic purposes

BNF sub-chapter	BNF description
4.7.1	Non-opioid analgesics and analgesic preparations
4.7.2	Opioid analgesics
4.7.3	Neuropathic pain
4.7.4	Antimigraine drugs
10.1.1	Drugs used in rheumatic disease and gout, NSAIDs
10.3.2	Drugs for the relief of soft tissue inflammation, rubefacients and other topical antirheumatics (contains only topical NSAIDs)

Table S2: Morphine-equivalent dose for opioid medication in the present study

Approved name	Formulation	Strength	Measure	Oral morphine-equivalent dose
Buprenorphine †	Tablets	200	mcg	16
Codeine phosphate	Tablets	15	mg	2.1
Diamorphine	Subcutaneous	10	mg	30
Dihydrocodeine tartrate	Tablets	30	mg	3
Fentanyl	Patch	12	mcg/hr	72
Fentanyl	Patch	50	mcg/hr	300
Meptazinol	Tablets	200	mg	6
Morphine	Capsules	60	mg	60
Morphine	Solution	10	mg/5ml	10
Morphine	Tablets	5	mg	5
Oxycodone	Tablets	20	mg	20
Pethidine	Tablets	50	mg	6
Tapentadol	Tablets	100	mg	30
Tramadol hydrochloride	Capsules	100	mg	10
Tramadol hydrochloride	Tablets	100	mg	10

† Buprenorphine was not available for conversion in the equianalgesic calculator so the Monthly Index of Medical Specialities (MIMS) conversion ratio of x80 was applied (<https://www.mims.co.uk/opioid-analgesics-approximate-potency-equivalence-oral-morphine/pain/article/1146201>). A wide range of conversion ratios are suggested in the literature for the equianalgesic computation of buprenorphine. However, this is unlikely to impact on the findings of the present study, since only one of the participants was prescribed buprenorphine, and none of the participants included in the regression analyses was prescribed this medication.

‡ It is acknowledged that the morphine equivalent of tramadol has not been reliably established, with significant inter-individual variability. Whilst the conversion ratios vary substantially for this medication using

different equianalgesic calculators, in an effort to maintain consistency, the same calculator was used for all possible conversions (i.e. for all drugs excepting buprenorphine).

Table S3: Dose-dependent morphine-equivalent ratios for methadone

Direct methadone-morphine conversion		
24 hour oral methadone total dose (recommended range)	Threshold dose used in present study	Conversion ratio (oral methadone to oral morphine)
< 15 mg	<12 mg	1:2
8-25 mg	12-19 mg	1:4
13-37 mg	20-31 mg	1:8
25-42 mg	32-37 mg	1:12
33-67 mg	38-58 mg	1:15
> 50 mg	>58 mg	1:20

NOTE: It is acknowledged that the morphine equivalent of methadone has not been reliably established, with significant inter-individual variability. Whilst the conversion ratios vary substantially for this medication using different equianalgesic calculators, in an effort to maintain consistency, the same calculator was used. There was a considerable overlap in oral methadone doses, and we used the mid-point of the overlap as the threshold value for each conversion ratio. It should be noted that a very small proportion of the participants were prescribed methadone for analgesic purposes, since it is rarely prescribed outside of the specialist setting.