**Appendix 3. Population demographics for all studies**

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| Author/ year of study | Tool(s) evaluated | | Sample size & population | Pain type & opioids received | Sex, age, socio-economic status | Known physical or psychiatric comorbidities |
| 1. **Tools predicting aberrant drug related behaviours or future prescription opioid misuse** | | | | | | |
| Friedman and co-workers, 2003 | STAR (Screening Tool for Addiction Risk) | | 14 subjects with substance abuse;  34 subjects without substance abuse | No details of pain.  Opioids for pain in all but one.  Subjects with active substance abuse only treated with methadone.  Subjects with addiction histories were treated with methadone as well as other sustained-release opioids. | Substance abuse (14): age range 27-78 (mean 53); opioid treatment 11; treatment failure 6; prescription problems 2; left pain center 8.  No substance abuse (34): age range 34-67 (mean 45); opioid treatment 15; treatment failure 0; prescription problems 0; left pain center 5. | Those with addiction were hospitalized for treatment of chronic infections and/ or AIDS |
| Michna and co-workers, 2004 | POTQ (Prescription Opioid Therapy Questionnaire) | | 145  Secondary care, chronic pain | 31.5% lower back primary pain site. Pain for an average of 98.1 months (SD 94.44, range 6-492). Average pain intensity 6.98 (0-10 scale) (SD 1.65).  Oxycodone with acetaminophen 32.7%; continuous release oxycodone 32.0%; continuous release morphine 20.4%; transdermal fentanyl 13.6%; oxycodone 10.9%; methadone 10.2%; hydrocodone 7.5%; other opioids 10.2%. 56 (38.1%) taking >1 opioid preparation. | Average age 43.2 (SD 8.46, range 21-69); 52.1% women | No serious progressive illness/ significant cardiac or respiratory disease. |
| Adams and co-workers, 2004 | PMQ (Pain Medication Questionnaire) | | 184  Secondary care, chronic pain | Lumbar spine (31.7%) & cervical spine (17.2%) back pain, and myofascialfibromyalgia (19.4%). Many had >1 diagnosis.  Opioids | 66.3% women; 33.7% men. (mean age 48.83 (SD 14.11)/ range 17-84).  84.2% Caucasian; 10.3% African-American; 5.4% Hispanic, Asian, other. 61.4% married; 18.5% single; 14.1% separated/ divorced; 6.0% widowed.  No significant differences in age, psychological functioning, disability measures between medical and interdisciplinary treatment groups.  24% receiving disability income; nearly 15% pending litigation.  H-PMQ group - significantly more married (67.7%) or separated/ divorced (17.7%) than L-PMQ (54.5% & 10.6%). L-PMQ group - significantly more single (22.7%) or widowed (12.1%) than H-PMQ (12.9% & 1.6%).  39.0% of H-PMQ group collecting disability payments versus 15.9% of L-PMQ (significant). Significantly higher mean PMQ scores in patients not working due to pain/ injury compared to those working (or not working for unrelated reasons) | Not given |
| Holmes and co-workers, 2006 | PMQ | | 271  Secondary care, chronic pain | Mean length of pain 77.4 months (SD 96.2).  Lumbar spine 51.3%, cervical spine 25.8%, myofascial/ fibromyalgia 33.5%.  Lower extremity 24.7%, neuralgia/ neuritis 18.2%, upper extremity 16%, headache 10.9%, thoracic 9.5%, abdominal 6.9%.  Opioids | 64.7% female;  Mean age 50.97 (SD=13.84), range 17-70; 85.8% white, 9.5% African-Americans, 4.7% Hispanic, Asian & other;  63.3% married, 12.7% single, 17.8% separated, 6.2% widowed.  >27% receiving disability income, 13% had pending litigation relating to pain | Not given |
| Dowling and co-workers, 2007 | PMQ | | 249  Secondary care, chronic pain | Divided into L-PMQ & H-PMQ scores:  H=3.5%/ L=7.4% acute; H=5.2%/ L=6.6% subacute; H= 91.3%/ L=86.1% chronic. Pain duration: H- mo 118, m 83.93, SD 99.24; L - mo113, m 71.38, SD105.91.  Pending litigation: H 8.1%; L 7.3%  Opioids | H-PMQ=60.9%/ L-PMQ=64.5% female; H-PMQ=77.3%/ L-PMQ=90.4% white;  H-PMQ=15.1%/ L-PMQ=5.2% African American;  H-PMQ=5.0%/ L-PMQ=3.5% Hispanic; H-PMQ= 0.8%/ L-PMQ=0.9% Asian;  H-PMQ-PMQ=1.7%/ L-PMQ=0% other. H-PMQ=54.8%/ L-PMQ=62.9% married;  H-PMQ=22.6%/ L-PMQ=11.2% separated/ divorced;  H-PMQ=16.1%/ L-PMQ=12.9% single; H-PMQ=6.8%/ L-PMQ=12.9% widowed.  H-PMQ=32.8%/ L-PMQ=17.5% on disability payments.  Age mean H-PMQ: 51.74, SD 14.81, range 15-87; L-PMQ:55.54, SD 16.84.  Significant differences in marital status & disability status | Not given |
| Buelow and co-workers, 2009 | PMQ (reduced-item) | | 1813  Secondary care, chronic pain | Not given | 64.7% female.  Mean age 51.89 (SD 19.1) Age range 14-98.  79.4% Caucasian; 12.4% African-Americans; 8.2% Asian, Hispanic or other races.  Significant differences found for age variable on L-PMQ, M-PMQ & H-PMQ | Not given |
| Hojsted and co-workers, 2011 | PMQ | | 209  Secondary care, chronic noncancer pain or cancer pain | 30% nociceptive; 31% neuropathic; 39% mixed. 28% only 1 pain location, 21% >3.  Non-malignant pain 93%.  Opioids | No significant differences age, gender, opioid use between participants and non-participants. 45 (17.7%) did not return questionnaires - so total response rate 78%.  Non-returners younger 45.8 (SD 12.0) versus 53.1 (SD 13.2) p=0.001; and higher opioid doses (p=0.026).  More non-responders rated as addicted (PC)(p<0.001).  Of 209: 40% lived alone; 34% had>10 years schooling; 84% had a vocational training; 77% unemployed | Not given |
| Butler and co-workers, 2004. | SOAPP (Screener and Opioid Assessment for Patients with Pain, Version 1.0) | | 175  Secondary care, chronic pain | 39.8% low back pain, and 31.2% of others multiple pain sites  Opioids. Immediate release (Oxycodone with acetaminophen; hydrocodone; oxycodone; morphine; hydromorphine; codeine; propoxyphene). Sustained release (oxycodone; methadone; transdermal fentanyl; morphine). | Average age 47.7 (SD = 11.2, range 23-88).  54.3% women;  90.9% Caucasian.  Of final 95, average age 47.5 (SD = 9.2, range 27-74); 50.5% women; 93.5% Caucasian | Not given |
| Akbik and co-workers, 2006 | SOAPP | | 397  Secondary care, chronic pain (238)  Veterans Administration Pain Center (159) | Center A: 43.9% low back pain primary.  Center B: 33.5% low back pain primary; 66% with service-connected injury  Opioids | Center A: 18-88 (mean 45.7 plus/minus 10.6); 87.4% Caucasian; 47.1% male.  Center B: 27-86 (mean 59.4 plus/minus 12.5); 98.1% male; estimate 70% Caucasian, 25% black, 5% Hispanic | Not given |
| Butler and co-workers, 2008 | Revised Screener and Opioid Assessment for Patients with Pain (SOAPP-R) | | 283 (for testing of beta version)  (85 for original empirical testing of alpha version)  Secondary care, chronic pain | Beta: 66.8% primary low back pain  Immediate release and sustained release opioids.  27% taking both long and short acting | Alpha (n=85): 47% men. Average age 48.8 (SD 11.44, range 22-84, median 47). 77% Caucasian, 10% African-American, 5% Hispanic, 5% Native American, 3% Asian or other. 85%high school education. Most quite disabled. 16.5% working, 41% on disability.  Beta (n=283): 44.4% women. Average age 49.8. 85.1% Caucasian | Not given |
| Butler and co-workers, 2009 | SOAPP-R | | 302  Secondary care, chronic pain | 59.6% primary low back pain  Opioids | Average age 51.3 (SD 13.2, range 22-83); 50% women: 79.8% Caucasian. Of retest sample completers, average age 50.3 (SD 12.6, range 25-77); 68.8% women; 64.1% Caucasian | Not given |
| Brown and co-workers, 2011 | SOAPP-R, as part of UP (universal precautions) approach. | | 1487  Primary care, chronic pain | Morphine sulfate extended release (MSER) capsules | Across 34 states in US and Puerto Rico. Of safety population - 57% women; 87% white; mean age 53 (range 21-92). 2% had participated in a drug treatment programme. 2% had participated in a 12-step programme. 5% reported history of using illicit substances | Not given |
| Webster and co-workers, 2005 | ORT (Opioid Risk Tool) | | 185  Secondary care, chronic pain | Lumbar spine pain most common; headache, neuropathic, musculoskeletal pain fairly evenly distributed; cervical spine pain least common.  Opioids | Females 108; males 77.  Patient characteristics tabulated for 3 risk groups (low, moderate and high). No differences between groups for age (p=0.067), gender (p=0.540) | Not given |
| Witkin and co-workers, 2013 | ORT | | 125  Secondary care, chronic pain | No details of pain  Opioids | Mean age 51;  41.6% female;  56% white; 33.6% African American; 36% single; 44% married; 15.2% separated or divorced; 4.8% widowed | Not given |
| Jones and co-workers, 2013 | BRI (Brief Risk Interview) | | 196  Secondary care, chronic pain | 60% had primary pain complaint of low back pain; 18% neck pain  Opioids. 31% long acting, 40% short acting. | 58% female.  Age 22-91 (mean 50.2).  36% had Medicare, 31% had private insurance, 22% had TennCare (Medicaid). | Not given |
| Jones and co-workers, 2014 | Prospective cohort study BRI | | 124  Secondary care, chronic pain | Low back pain 44%; neck pain 26%; headache 13%  75/124 patients (60%) prescribed opioid. 100% short acting; 7 (9%) long acting as well | Age 19-85 (32% 40-49).  Race not recorded in 32%. Where race recorded, 80% Caucasian.  67% female.  Marital status not recorded in 30 patients; where recorded, 55% married, 21% single, 19% divorced, 5% separated or widowed. | Not given |
| Jones and co-workers, 2015 | BRQ (Brief Risk Questionnaire) | | 257 prescribed opioid for > 1 month & FU visit  Secondary care, chronic pain (psychology) | 80% prescribed short acting opioid; 48% prescribed long acting opioid. | 96% Caucasian; 49% female; mean age 54.6 (range 21-82). 23% were ≥65 | Not given |
| 1. **Tools screening for current aberrant drug related behaviours or opioid misuse** | | | | | | |
| Manchikanti and co-workers, 2003 | Unnamed tool | | 500  Secondary care, chronic pain (400 without and 100 with a history of drug abuse | Pain >6 months. No differences between groups as regards duration of pain & history of previous spine surgery  All on opiates at start | No differences between groups as regards gender (more women than men), height, weight. | Not given |
| Butler and co-workers, 2007 | COMM (Current Opioid Misuse Measure) | | 227  Secondary care, chronic pain | 67.9% low back pain  Opioids | 62% women; 35.7% men (missing info for 6). 14.1% minorities. Mean age 50.8 (SD + 12.4, range 21-89). 83.3% Caucasian. 43% married. 87.3% high school graduate | Not given |
| Butler and co-workers, 2010 | COMM | | 226  Secondary care, chronic pain | Pain relief from medication and pain interference with activity both less than in original validation sample  Opioids | 48.2% women (significantly fewer than in original validation sample). 56.5% married (significantly more than in original validation sample). Race, education level and age included, not significantly different from original sample | Not given |
| Meltzer and co-workers, 2011 | COMM | | 238  Primary care, chronic pain | Chronic pain≥3 months  Opioids | Few differences between 2 groups as regards gender, race, educational level. Mean age in 40s, largely African American, majority had 12 or more years education. At least 50% of those with and without PDD were receiving disability payments. | Nearly 1/3 of each group had lifetime PTSD. Those with PDD more likely to have current depression, smoke or have past year other drug disorder |
| Knisely and co-workers, 2008 | POMI (Prescription Opioid Misuse Index) | | 74  Recruited from community substance abuse treatment programs, regional jails, pain clinics & private internal medicine practices | No details regarding pain.  All prescribed OxyContin | No group differences between those with substance abuse and pain regarding gender, ethnicity or education.  Substance abuse 92% Caucasian; pain 97% Caucasian.  Substance abuse mean high school education 12.6 years; pain 13 years.  Pain 56% females; substance abuse 35% females (no statistical significance). Substance abuse group significantly younger (M=33.8 years) than pain (M=43.9 years, p<.0001).  Substance abuse group less likely to be married than pain group (30% versus 53%, p<.01) | ASI: rates for depression and anxiety greater than 68% for both groups. |
| 1. **Tools screening for and predicting both current *and* future aberrant drug related behaviours or prescription opioid misuse** | | | | | | |
| Compton and co-workers, 1998 | Prescription Drug Use Questionnaire (PDUQ) | | 52  Secondary care, chronic pain (referred for psychiatric evaluation) | 65% > one pain condition  Opioids | 60& female.  Age 20-66 (mean 41.4, SD 9.55).  58% married.  92% white | 67% psychiatric morbidity (did not distinguish addicted from non-addicted). History of sexual or physical abuse in 31% ( not more in addicted group) |
| Compton and co-workers, 2008. | PDUQp (Prescription Drug Use Questionnaire p) | | 135  Secondary care, chronic pain (veterans) | 104 primary musculoskeletal pain; 26 primary neuropathic pain; remaining 5 multi-category or unclear  Opioids | Mean age 53 (25-65).  127 male, 8 female.  53 (39%) married or cohabiting;  18 (13%) never married; 54 (40%) divorced or separated; 8 (6%) widowed. 17 (13%) working FT; 8 (6%) working PT; remainder (81%) not working. Of 105 not working, 47 (45%) unemployed or unable to work due to pain | Not given |
| Jamison and co-workers, 2014 | OCC (Opioid Compliance Checklist) | | 157  Secondary care, chronic pain | Pain> 6 months; average 4 or more on pain intensity scale 1-10.  24.8% primary lower back pain  Opioids | Average age 49.3 (SD 8.4, range 24-81). 59.7% women;  72.5% white | Exclusions: cancer; acute bone disease; DSM mental disorder that would interfere; pregnancy; clinically unstable systemic illness; pain condition requiring urgent surgery; active addiction disorder that would interfere. |
| Jamison and co-workers, 2015 | OCC | | 253  Primary care, chronic pain | Most back pain. 78% multiple pain sites  Opioids | 106 (59.9%) female;  74.4% Caucasians | Exclusions: cancer; acute bone disease; DSM mental disorder that would interfere; pregnancy; clinically unstable systemic illness; pain condition requiring urgent surgery; active addiction disorder that would interfere |
| 1. **Studies comparing different tools** | | | | | | |
| Jones and co-workers, 2012 | * SOAPP-R * PMQ * ORT | | 132 (study 1).  263 (study 2)  Secondary care, chronic pain | Study 1: 47% low back pain; 14% pervasive pain; 12% neck pain; 10% lower extremity pain.  Study 2: 45% low back pain; 21% pervasive pain; 14% joint pain; 10% pelvic or abdominal pain; 7% neck or upper back pain | Study 1: ≥18; mean age 42.7 (SD = 12.0, range 19-76). 51% female. 42% married; 31% divorced; 20% single.  Study 2: (Of 263 used for final prediction analysis) Mean age 47.5 (SD 12.7); 96% white; 56% female; 53% married; 28% divirced; 73% unemployed/ disabled; 19% working FT | Not given |
| Ferrari and co-workers, 2014 | * PMQ * DIRE (Diagnosis Intractability Risk and Efficacy Score) | | 75  Secondary care, chronic pain | 50.7% oral oxycodone  40% fentanyl | Age mean 51.5 (SD 11.7);  76% female;  74.6% married, 15.3% single, 9.3% separated, 1% widowed  Years of education provided; 37.3% employed, 2.7% unemployed, 29.3% housewife, 30.7% retired |  |
| Moore and co-workers, 2009 | * SOAPP * DIRE * ORT | | 48  Secondary care, chronic pain | Not given | 29 (60.4%) female, 19 (39.6%) male.  Mean age 43.9 (SD 10.7);  19 (39.6%) married; 19 (39.6%) divorced. | Not given |
|  | | 1. **Tools used to monitor aberrant drug related behaviours or prescription opioid misuse** | | | | |
| Passik and co-workers, 2004 | Pain Assessment and Documentation Tool (PADT) | | 388  Primary & secondary care, chronic pain | All prescribed opioids | 36.3% men; 63.7% women  (Of 383): 84.1% white; 7.6% black; 6.0% Hispanic; 0.5% Asian  (Of 377): 3.4% Grades 1-8; 10.9% some high school; 24.7% high school degree; 30.5% some college; 16.7% college degree; 6.4% post college work; 7.4% advanced degree  (Of 388): 20.6% work FT; 8.0% PT; 6.4% homemaker; 41.2% disabled; 6.7% unemployed; 15.5% retired; 1.6% student  (Of 371): (Prior to pain diagnosis) 67.4% worked FT 67.4%; 8.6% PT; 6.7% homemaker; 6.7% disabled; 2.2% retired; 6.5% retired; 1.9% student | Not given |
| Wu and co-workers, 2006 | ABC (Addiction Behaviors Checklist) | | 136  Secondary care, chronic pain (veterans) |  | Mean age 53 (25-65).  8 (5.9%) female, 128 (94.1%) male.  53 (39%) married or cohabiting; 19 (14%) never married; 55 (41%) divorced or separated; 8 (6%) widowed.  17 (13%) working FT; 8 (6%) working PT; 107 (81%) not working (of these, 46% unable to work due to pain) | Not given |
| 1. **Systematic Reviews** | | | | | | |
| Turk and co-workers, 2008 | * SISAP * PDUQ * STAR * POTQ * PMQ * SOAPP * ORT * ABC * COMM | | Individual studies | Individual studies | Individual studies | Individual studies |
| Chou and co-workers, 2009 | **Tools predicting ADRB**:   * SOAPP V.1 * SOAPP-R * ORT (Opioid Risk Tool)   **Screening instruments identifying current ADRB**:   * PMQ * 6-item instrument (Atluri, 2004) * COMM * PDUQ * 4 item instrument (Manchikanti, 2004) * Michna (2004) * PDUQ (psychiatric items, Wasan, 2007) * ABC | | Individual studies | Individual studies | Individual studies | Individual studies |
| Becker and co-workers, 2013 | * PADT * COMM * PDUQ-p * mPMQ * POMI * PODS | | Individual studies | Individual studies | Individual studies | Individual studies |