



Table S1. Treatment strategy for patients with mild OA

| | Primary care physician (n = 81) | Rheumatologist (n = 35) | Orthopaedic surgeon (n = 37) | <i>P</i> value |
|--|---------------------------------------|----------------------------|------------------------------------|----------------|
| First-line treatment for mild OA | | | | |
| Lifestyle changes, e.g., diet/exercise | 67 (82.7) | 32 (91.4) | 32 (86.5) | .4638 |
| Over-the-counter therapy | 52 (64.2) | 13 (37.1) | 24 (64.9) | .0162 |
| Dietary supplements | 27 (33.3) | 5 (14.3) | 10 (27.0) | .1077 |
| Nonselective NSAID | 32 (39.5) | 7 (20.0) | 13 (35.1) | .1241 |
| Selective NSAID | 16 (19.8) | 4 (11.4) | 7 (18.9) | .5434 |
| Other nonopioid analgesic | 7 (8.6) | 3 (8.6) | 2 (5.4) | .8524 |
| Corticosteroid | 0 (0.0) | 0 (0.0) | 2 (5.4) | .1084 |
| Topical analgesic | 20 (24.7) | 6 (17.1) | 6 (16.2) | .4739 |
| None | 1 (1.2) | 0 (0.0) | 0 (0.0) | 1 |
| Second-line treatment for mild OA | | | | |
| Lifestyle changes, e.g., diet/exercise | 11 (13.6) | 4 (11.4) | 2 (5.4) | .4623 |
| Over-the-counter therapy | 25 (30.9) | 16 (45.7) | 9 (24.3) | .1354 |
| Dietary supplements | 12 (14.8) | 6 (17.1) | 3 (8.1) | .5228 |
| Nonselective NSAID | 31 (38.3) | 11 (31.4) | 18 (48.6) | .3163 |
| Selective NSAID | 31 (38.3) | 11 (31.4) | 18 (48.6) | .3163 |
| Other nonopioid analgesic | 25 (30.9) | 6 (17.1) | 14 (37.8) | .1433 |
| Weak opioid analgesic | 15 (18.5) | 3 (8.6) | 1 (2.7) | .0392 |
| Strong-acting opioid analgesic | 2 (2.5) | 0 (0.0) | 0 (0.0) | 1 |
| Corticosteroid | 12 (14.8) | 6 (17.1) | 11 (29.7) | .1515 |
| Topical analgesic | 15 (18.5) | 11 (31.4) | 11 (29.7) | .2187 |
| Other (specify) | 0 (0.0) | 0 (0.0) | 1 (2.7) | .4706 |
| Third-line treatment for mild OA | | | | |
| Lifestyle changes, e.g., diet/exercise | 10 (12.3) | 5 (14.3) | 2 (5.4) | .4349 |
| Over-the-counter therapy | 5 (6.2) | 2 (5.7) | 0 (0.0) | .3999 |
| Dietary supplements | 9 (11.1) | 5 (14.3) | 5 (13.5) | .8489 |
| Nonselective NSAID | 16 (19.8) | 13 (37.1) | 6 (16.2) | .0667 |
| Selective NSAID | 21 (25.9) | 8 (22.9) | 11 (29.7) | .8008 |
| Other nonopioid analgesic | 17 (21.0) | 6 (17.1) | 9 (24.3) | .7553 |
| Weak opioid analgesic | 27 (33.3) | 6 (17.1) | 12 (32.4) | .192 |
| Strong-acting opioid analgesic | 14 (17.3) | 5 (14.3) | 2 (5.4) | .1971 |
| Corticosteroid | 18 (22.2) | 9 (25.7) | 12 (32.4) | .4978 |
| Topical analgesic | 20 (24.7) | 3 (8.6) | 8 (21.6) | .1362 |
| Surgery | 4 (4.9) | 0 (0.0) | 4 (10.8) | .0851 |
| None | 1 (1.2) | 1 (2.9) | 2 (5.4) | .3428 |
| Other (specify) | 0 (0.0) | 1 (2.9) | 1 (2.7) | .2198 |
| Fourth-line treatment for mild OA | | | | |
| Lifestyle changes, e.g., diet/exercise | 7 (8.6) | 2 (5.7) | 0 (0.0) | .175 |

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|--------------------------------|-----------|-----------|-----------|-------|
| Over-the-counter therapy | 3 (3.7) | 2 (5.7) | 0 (0.0) | .3365 |
| Dietary supplements | 4 (4.9) | 3 (8.6) | 3 (8.1) | .6884 |
| Nonselective NSAID | 3 (3.7) | 4 (11.4) | 1 (2.7) | .2179 |
| Selective NSAID | 15 (18.5) | 8 (22.9) | 2 (5.4) | .1 |
| Other nonopioid analgesic | 7 (8.6) | 4 (11.4) | 2 (5.4) | .6345 |
| Weak opioid analgesic | 16 (19.8) | 4 (11.4) | 7 (18.9) | .5434 |
| Strong-acting opioid analgesic | 30 (37.0) | 8 (22.9) | 13 (35.1) | .3194 |
| Corticosteroid | 29 (35.8) | 8 (22.9) | 6 (16.2) | .0659 |
| Topical analgesic | 15 (18.5) | 3 (8.6) | 4 (10.8) | .291 |
| Surgery | 36 (44.4) | 13 (37.1) | 20 (54.1) | .3487 |
| None | 4 (4.9) | 2 (5.7) | 5 (13.5) | .2752 |

Data are n (%) of physicians. *P* value for comparison across physician specialties.

NSAID, nonsteroidal anti-inflammatory drug; OA, osteoarthritis.

Table S2. Treatment strategy for patients with moderate/severe OA

| | Primary care physician (n = 81) | Rheumatologist (n = 35) | Orthopaedic surgeon (n = 37) | P value |
|---|---------------------------------------|----------------------------|------------------------------------|---------|
| First-line treatment for moderate/severe OA | | | | |
| Lifestyle changes, e.g., diet/exercise | 57 (70.4) | 27 (77.1) | 29 (78.4) | .5777 |
| Over-the-counter therapy | 41 (50.6) | 13 (37.1) | 18 (48.6) | .4004 |
| Dietary supplements | 28 (34.6) | 8 (22.9) | 9 (24.3) | .3291 |
| Nonselective NSAID | 47 (58.0) | 16 (45.7) | 24 (64.9) | .2486 |
| Selective NSAID | 31 (38.3) | 8 (22.9) | 18 (48.6) | .0745 |
| Other nonopioid analgesic | 16 (19.8) | 7 (20.0) | 7 (18.9) | .9922 |
| Weak opioid analgesic | 5 (6.2) | 2 (5.7) | 1 (2.7) | .7968 |
| Strong-acting opioid analgesic | 1 (1.2) | 0 (0.0) | 1 (2.7) | .7214 |
| Corticosteroid | 5 (6.2) | 3 (8.6) | 5 (13.5) | .4374 |
| Topical analgesic | 17 (21.0) | 9 (25.7) | 7 (18.9) | .769 |
| Surgery | 1 (1.2) | 0 (0.0) | 2 (5.4) | .2764 |
| None | 1 (1.2) | 0 (0.0) | 0 (0.0) | 1 |
| Second-line treatment for moderate/severe OA | | | | |
| Lifestyle changes, e.g., diet/exercise | 17 (21.0) | 6 (17.1) | 4 (10.8) | .4029 |
| Over-the-counter therapy | 16 (19.8) | 5 (14.3) | 4 (10.8) | .4436 |
| Dietary supplements | 17 (21.0) | 6 (17.1) | 4 (10.8) | .4029 |
| Nonselective NSAID | 27 (33.3) | 10 (28.6) | 10 (27.0) | .7509 |
| Selective NSAID | 40 (49.4) | 16 (45.7) | 21 (56.8) | .6254 |
| Other nonopioid analgesic | 28 (34.6) | 14 (40.0) | 16 (43.2) | .6388 |
| Weak opioid analgesic | 30 (37.0) | 11 (31.4) | 5 (13.5) | .0347 |
| Strong-acting opioid analgesic | 10 (12.3) | 2 (5.7) | 1 (2.7) | .2106 |
| Corticosteroid | 15 (18.5) | 14 (40.0) | 18 (48.6) | .0018 |
| Topical analgesic | 26 (32.1) | 10 (28.6) | 14 (37.8) | .6948 |
| Surgery | 4 (4.9) | 1 (2.9) | 4 (10.8) | .3794 |
| Third-line treatment for moderate/severe OA | | | | |
| Lifestyle changes, e.g., diet/exercise | 13 (16.0) | 7 (20.0) | 3 (8.1) | .3446 |
| Over-the-counter therapy | 2 (2.5) | 4 (11.4) | 2 (5.4) | .1034 |
| Dietary supplements | 6 (7.4) | 3 (8.6) | 3 (8.1) | 1 |
| Nonselective NSAID | 11 (13.6) | 10 (28.6) | 3 (8.1) | .0435 |
| Selective NSAID | 20 (24.7) | 8 (22.9) | 7 (18.9) | .7867 |
| Other nonopioid analgesic | 17 (21.0) | 9 (25.7) | 6 (16.2) | .6122 |
| Weak opioid analgesic | 29 (35.8) | 12 (34.3) | 12 (32.4) | .9371 |
| Strong-acting opioid analgesic | 29 (35.8) | 9 (25.7) | 7 (18.9) | .1506 |
| Corticosteroid | 30 (37.0) | 15 (42.9) | 15 (40.5) | .8256 |
| Topical analgesic | 22 (27.2) | 5 (14.3) | 4 (10.8) | .0741 |
| Surgery | 12 (14.8) | 3 (8.6) | 11 (29.7) | .0431 |
| None | 0 (0.0) | 1 (2.9) | 1 (2.7) | .2198 |

| | | | | |
|---|-----------|-----------|-----------|-------|
| Other (specify) | 0 (0.0) | 1 (2.9) | 0 (0.0) | .2288 |
| Fourth-line treatment for moderate/severe OA | | | | |
| Lifestyle changes, e.g., diet/exercise | 12 (14.8) | 5 (14.3) | 1 (2.7) | .1218 |
| Over-the-counter therapy | 3 (3.7) | 2 (5.7) | 0 (0.0) | .3365 |
| Dietary supplements | 4 (4.9) | 3 (8.6) | 2 (5.4) | .7449 |
| Nonselective NSAID | 4 (4.9) | 3 (8.6) | 0 (0.0) | .1618 |
| Selective NSAID | 6 (7.4) | 8 (22.9) | 1 (2.7) | .0125 |
| Other nonopioid analgesic | 6 (7.4) | 5 (14.3) | 0 (0.0) | .0511 |
| Weak opioid analgesic | 12 (14.8) | 7 (20.0) | 6 (16.2) | .7861 |
| Strong-acting opioid analgesic | 30 (37.0) | 18 (51.4) | 16 (43.2) | .3464 |
| Corticosteroid | 32 (39.5) | 7 (20.0) | 4 (10.8) | .0027 |
| Topical analgesic | 10 (12.3) | 5 (14.3) | 3 (8.1) | .7117 |
| Surgery | 49 (60.5) | 23 (65.7) | 24 (64.9) | .8275 |
| None | 3 (3.7) | 0 (0.0) | 4 (10.8) | .0891 |

Data are n (%) of physicians. *P* value for comparison across physician specialties

NSAID, nonsteroidal anti-inflammatory drug; OA, osteoarthritis.

Table S3. Physician ratings of medication performance against attributes for the treatment of OA-related pain

| Attribute | Medication | Primary care | Rheumatologist | Orthopaedic | P value |
|-----------------------------|---------------------------|-----------------------|----------------|---------------------|---------|
| | | physician (n = 81) | | surgeon (n = 37) | |
| Efficacy† | Overall medications | 0.3 (0.74) | −0.0 (0.80) | −0.1 (0.92) | .0195 |
| | NSAID | 0.3 (0.95) | 0.0 (1.00) | 0.0 (0.90) | .1009 |
| | Nonopioid analgesic | 0.1 (1.02) | −0.2 (0.92) | −0.4 (1.01) | .0410 |
| | Weak opioid | 0.2 (0.95) | −0.2 (1.10) | −0.5 (1.32) | .0122 |
| | Strong opioid | 0.5 (1.03) | 0.2 (1.23) | −0.1 (1.40) | .0248 |
| | Injectable corticosteroid | 1.1 (1.04) | 0.8 (0.97) | 0.9 (0.94) | .3579 |
| | Topical analgesic | −0.3 (1.19) | −0.6 (1.14) | −0.6 (1.38) | .2545 |
| Safety‡ | Overall medications | 0.3 (0.79) | 0.3 (0.99) | 0.3 (0.88) | .9588 |
| | NSAID | 0.1 (1.03) | −0.1 (1.15) | 0.2 (1.14) | .4220 |
| | Nonopioid analgesic | 0.4 (1.09) | 0.4 (1.22) | 0.5 (1.22) | .9768 |
| | Weak opioid | −0.2 (1.17) | −0.1 (1.23) | −0.5 (1.19) | .2266 |
| | Strong opioid | −0.4 (1.09) | −0.3 (1.27) | −0.8 (1.18) | .1355 |
| | Injectable corticosteroid | 0.7 (1.03) | 0.8 (1.26) | 0.9 (0.97) | .4597 |
| | Topical analgesic | 1.6 (1.00) | 1.5 (1.17) | 1.7 (1.13) | .8286 |
| Convenience/ acceptability§ | Overall medications | 1.4 (0.82) | 1.3 (0.91) | 1.4 (0.96) | .9591 |
| | NSAID | 1.8 (0.94) | 1.5 (0.98) | 1.7 (1.03) | .3250 |
| | Nonopioid analgesic | 1.6 (0.99) | 1.5 (1.04) | 1.6 (1.12) | .8941 |
| | Weak opioid | 1.3 (1.06) | 1.3 (1.13) | 1.2 (1.21) | .9170 |
| | Strong opioid | 1.1 (1.07) | 1.2 (1.03) | 1.1 (1.37) | .8108 |
| | Injectable corticosteroid | 0.9 (0.99) | 1.1 (1.02) | 1.0 (0.90) | .6614 |
| | Topical analgesic | 1.2 (1.10) | 1.2 (0.97) | 1.3 (0.96) | .9395 |
| Cost consideration¶ | Overall medications | 1.0 (0.93) | 0.8 (1.14) | 0.9 (1.00) | .4996 |
| | NSAID | 1.5 (1.13) | 1.0 (1.16) | 1.4 (1.04) | .1018 |
| | Nonopioid analgesic | 1.4 (1.17) | 0.9 (1.39) | 1.5 (1.12) | .0624 |
| | Weak opioid | 1.0 (1.31) | 0.8 (1.24) | 0.5 (1.48) | .2353 |
| | Strong opioid | 0.8 (1.35) | 0.7 (1.32) | 0.4 (1.62) | .2617 |
| | Injectable corticosteroid | 0.4 (1.28) | 1.1 (1.35) | 0.7 (1.62) | .0482 |
| | Topical analgesic | 0.6 (1.53) | 0.2 (1.60) | 0.7 (1.60) | .3328 |
| Quality of life†† | Overall medications | 0.8 (0.86) | 0.5 (0.93) | 0.4 (1.13) | .0884 |
| | NSAID | 0.9 (1.02) | 0.4 (1.22) | 0.5 (1.19) | .1045 |
| | Nonopioid analgesic | 0.7 (1.10) | 0.5 (0.98) | 0.4 (1.26) | .3677 |
| | Weak opioid | 0.6 (1.11) | 0.4 (1.06) | −0.2 (1.36) | .0035 |
| | Strong opioid | 0.6 (1.16) | 0.5 (1.09) | −0.3 (1.54) | .0033 |
| | Injectable corticosteroid | 1.3 (1.00) | 1.1 (0.99) | 1.2 (1.18) | .7907 |
| | Topical analgesic | 0.6 (1.20) | 0.3 (1.30) | 0.6 (1.57) | .5642 |

Data are mean score (standard deviation) of attributes within each category with scores ranging per attribute from −3 (performs very badly) to +3 (performs very well). P value for comparison across physician specialties.

†Mean of 8 attributes: effective relief of pain at rest, effective relief of pain on movement, reduces number of tender/swollen joints, maintains symptomatic relief over time without need to increase dose/alter frequency, rapid onset of action, effective in controlling acute flares, slows disease progression and, delays need for surgery.

‡Mean of 9 attributes: safe long-term use, good gastrointestinal safety, low incidence of serious adverse events/severe side effects, suitable for patients with cardiovascular risk, can be used continuously (without a drug break), appropriate for use in the elderly (>65 years), no need for frequent monitoring/testing, low risk of addiction/abuse and, can be used in combination with other pain drugs.

§Mean of 6 attributes: ease of administration for patient, convenient dosing schedule, physician familiarity/experience, on formulary/hospital approved drug list, can be used in combination with other OA therapies and, accordance with treatment guidelines.

¶Mean of 2 attributes: low out of pocket cost/affordability for patient and, low cost/affordable for physician/practice.

††Mean of 6 attributes: improves/maintains attendance at work, improves/maintains ability to perform activities of daily living/leisure activities, improves/maintains relationships/social life, improves patient functionality, improves patient's sleep patterns/quality of sleep and, improves/maintains patient's independence.

NSAID, nonsteroidal anti-inflammatory drug; OA, osteoarthritis.

Table S4. Physician perceptions related to the use of opioids: barriers to prescribing

| Characteristics | Primary care | Rheumatologist | Orthopaedic | P value |
|--|-----------------------|----------------|---------------------|---------|
| | physician (n = 81) | | surgeon (n = 37) | |
| Barriers to opioid prescribing | | | | |
| Fear of addiction | 33.0 (24.27) | 21.8 (24.86) | 24.9 (23.67) | .0459 |
| Fear of drug abuse | 14.2 (15.51) | 14.1 (12.48) | 13.0 (10.17) | .8996 |
| Lack of efficacy as a chronic OA pain treatment | 9.5 (13.94) | 11.6 (16.03) | 20.0 (26.67) | .0157 |
| Side effects | 10.6 (10.14) | 12.0 (10.74) | 14.6 (17.22) | .2696 |
| Tolerance | 9.4 (9.92) | 7.2 (8.38) | 8.5 (11.95) | .5574 |
| Guidelines/local restrictions | 5.2 (9.52) | 13.1 (23.01) | 5.8 (11.64) | .0212 |
| Fear of drug diversion | 5.8 (12.50) | 5.8 (7.63) | 3.6 (4.66) | .5209 |
| General lack of comfort in prescribing opioids | 5.5 (13.65) | 6.1 (7.08) | 3.1 (7.11) | .4438 |
| Patient preference (i.e., patient refusal of opioid) | 2.9 (4.72) | 3.2 (4.75) | 3.3 (4.27) | .8892 |
| Other | 2 (12.89) | 2.9 (16.9) | – | .5947 |
| No barriers at all | 1.9 (6.57) | 2.2 (7.71) | 3.2 (11.01) | .6873 |

Data are mean score (standard deviation) of physician allocated points out of 100 distributed based on level of importance across the list of attributes such that higher scores = greater perceived barrier. *P* value for comparison across physician specialties.

OA, osteoarthritis.