Appendix

Table A1. Search strategy

| MEDLINE (N = 97 studies) | EMBASE (N = 897 studies) | PubMed (N = 120 studies) |
|-------------------------|--------------------------|--------------------------|
| 1. Knee/ or Knee.mp.    | 1. Knee.mp.              | (Knee) AND ((osteoarthritis) OR (arthrosis) OR (arthritis)) AND ((brace) AND ((valgus) OR (unloading) OR (unloader))) |
| 2. osteoarthritis.mp.   | 2. osteoarthritis.mp.    |                          |
| or Osteoarthritis/Knee  | 3. arthritis.mp.        |                          |
| 3. Arthritis/ or arthritis.mp. | 4. arthrosis.mp. |                          |
| 4. Arthrosis.mp. or Joint Diseases | 5. brace.mp. |                          |
| 5. Brace.mp. or Braces/ | 6. valgus.mp.           |                          |
| 6. valgus.mp.           | 7. unloading.mp.        |                          |
| 7. unloading.mp.        | 8. unloader.mp.         |                          |
| 8. unloader.mp.         | 9. 2 or 3 or 4          |                          |
| 9. 2 or 3 or 4          | 10. 6 or 7 or 8         |                          |
| 10. 6 or 7 or 8         | 11. 5 and 10            |                          |
| 11. 5 and 10            | 12. 1 and 9 and 11      |                          |
| 12. 1 and 9 and 11      |                          |                          |

Clinical Outcomes

Pain

Pain scores significantly improved in a total of 15 studies. Pain scores significantly improved using the visual analog scale (VAS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain score, and Knee injury and Osteoarthritis Outcome Score (KOOS) pain score in 10, 12, 18, 21, 25, 32, 44, 47, 49, 51, 52 6, 13, 18-20, 25, 32, and 29, 44 studies, respectively. There were no significant improvements in WOMAC pain scores in 3 studies. The mean differences for VAS, WOMAC pain, and KOOS pain scores were −2.57 (95% CI, −3.34 to −1.80), −8.13 (95% CI, −20.86 to 4.59), and 11.70 (95% CI, 3.62 to 19.78), respectively, favoring the use of the valgus offloader brace (Table 2).
**Gait Velocity**

Gait velocity significantly improved in 6 studies,$^{2,12,30,32,44,52}$ with a trend toward improvement in a further 4 studies$^{12,13,23,47}$ (Table 2).

**Function**

Significant improvements were seen in function in 2 studies$^{14,49}$ that used the Hospital for Special Surgery (HSS) knee score and in 4 studies$^{13,20,25,32}$ that used the WOMAC function score. No significant difference was found in 3 studies$^{13,22,23}$ using WOMAC function and 1 prospective cohort$^{33}$ using the Knee Society Score (KSS). The mean differences for HSS, WOMAC function, and KSS scores were 13.40 (95% CI, 9.04 to 17.76), −6.57 (95% CI, −18.16 to 5.01), and 7.20 (95% CI, −0.17 to 14.56), respectively, favoring the use of the valgus offloader brace. The mean difference in KSS for Kellgren-Lawrence (KL) grades 1 and 2 and KL grades 3 and 4 were 4.63 (95% CI, −6.08 to 15.34) and 9.50 (95% CI –0.64 to 19.64), respectively, favoring the use of the valgus offloader brace (Table 2).

**Stiffness**

Stiffness was significantly improved, as assessed by WOMAC stiffness outcome score in 2 studies.$^{13,32}$ However, no significant difference in stiffness was seen in 3 studies$^{18,23,25}$ using the same outcome measure. The mean difference for WOMAC stiffness scores was −9.50 (95% CI, −17.22 to −1.77), favoring the use of the valgus offloader brace (Table 2).

**Activities of Daily Living**
The valgus offloader brace significantly improved ability to perform ADLs in 2 studies\textsuperscript{29,44} using the KOOS score and did not show a significant difference in 1 study\textsuperscript{18} using the WOMAC ADL score. The mean difference in ADL using the KOOS score was 14.00 (95% CI, 6.06 to 21.94), favoring the use of valgus offloader bracing (Table 2).

\textbf{Comparative Outcomes}

\textit{Neutral Brace}

When comparing the use of an offloader brace to patients with a neutral alignment brace, there were significant differences found favoring the valgus offloader brace with regard to pain relief ($P = 0.037$), minimizing difficulty in function ($P = 0.032$), and minimizing stiffness ($P = 0.021$), as reported by Yeung et al.\textsuperscript{58} A significant difference ($P = 0.049$) was found favoring the valgus offloader brace for the KOOS Symptoms subscale by Ramsey et al\textsuperscript{48} (Table 3). A pooled mean difference between valgus offloader and neutral braces could not be determined due to unavailable data.

\textit{Unbraced}

Sattari et al\textsuperscript{51} found significant differences favoring the valgus offloader brace for walking distance ($P = 0.034$) and change in pain using the VAS ($P = 0.020$). A nonsignificant difference was found for VAS in 2 studies\textsuperscript{11,45} (Table 3). In contrast, Della Croce et al\textsuperscript{11} found no significant difference in gait velocity when comparing the use of an offloader brace to a control group of unbraced patients. Moyer et al\textsuperscript{39} also found no differences between the 2 groups for gait velocity during stair ascent and descent.
**Lateral-Wedged Insole**

When comparing the use of an offloader bracing to patients with lateral-wedged insoles, there were no significant differences in gait velocity, improved walking distance, or WOMAC (pain, stiffness, or function) in 2, 25, 39, 1, 16, and 1 study, respectively (Table 3). van Raaij et al55 determined a mean difference of 0.06 (95% CI, −1.05 to 0.93) and 0.15 (95% CI, −7.95 to 7.65; effect size = 0.008) for VAS and WOMAC function, respectively, between the valgus offloader and lateral-wedged insole conditions. From the available data from Jones et al,25 we were able to determine a mean difference of −0.20 (95% CI, −1.41 to 1.01) for VAS, −1.80 (95% CI, −8.42 to 4.82) for WOMAC pain, −0.50 (95% CI, −7.91 to 6.91) for WOMAC function, and −3.10 (95% CI, −17.15 to 10.95) for WOMAC stiffness between the valgus offloader brace and lateral-wedged insole conditions. We could not calculate a pooled mean difference from these 2 studies due to unavailable data.25,56

**Neoprene Sleeve**

When comparing the use of an offloader braced to patients with a neoprene sleeve, statistically significant differences were identified favoring valgus offloader brace with regard to WOMAC pain scores (P = 0.045), the 6-minute walk test (P = 0.021), and the 30-second stair-climbing test (P = 0.016), as described by Kirkley et al.27 A trend toward favoring offloading braces was identified in the WOMAC aggregate score (P = 0.066), WOMAC stiffness (P = 0.91), WOMAC physical (P = 0.081), and McMaster Toronto Arthritis patient preference questionnaire (MACTAR) change score (P = 0.174) (Table 3).

**Other Outcomes**
Kirkley et al\textsuperscript{27} also compared the use of a valgus offloader brace with a control group receiving “standard treatment,” which included acetaminophen and NSAIDs on an as-needed basis for pain relief, home exercise program for flexibility (no formal physiotherapy), and an educational pamphlet on OA of the knee. There were significant differences found favoring the valgus offloader brace in the WOMAC aggregate score ($P < 0.001$), WOMAC pain ($P < 0.001$), WOMAC stiffness ($P < 0.001$), WOMAC physical ($P = 0.001$), MACTAR change score ($P = 0.017$), 6-minute walk test ($P < 0.001$), and 30-second stair-climbing test ($P < 0.001$) (Table 3).