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# What Systematic Reviews Exist for the Effectiveness of Orthopaedic Interventions

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## Abstract

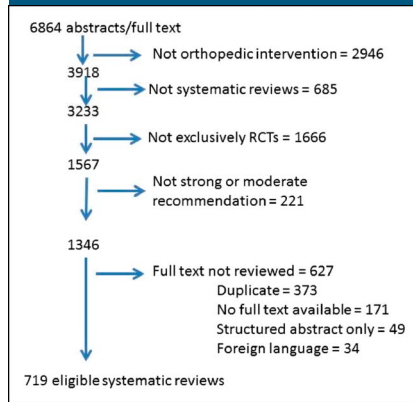
**Introduction:** Orthopaedics procedures are frequent and expensive, but highly cost effective in improving the quality of life. The purpose of this study was to determine the number and topics of systematic overviews on the effectiveness of orthopaedic interventions.

**Methods:** We performed a review of PubMed, Ovid Embase, Scopus, OrthoEvidence, and the Cochrane Library for dates of publication from January 1, 2006, to February 3, 2017, to identify systematic overviews of randomized clinical trials for the effectiveness of therapeutic interventions involving orthopaedic surgeons. Abstracts were excluded based on the following sequentially applied criteria: (1) the systematic review did not include an intervention for an orthopaedic condition; the intervention was not therapeutic; the intervention was not likely to be applied or influenced by an orthopaedic surgeon; (2) the study was not a systematic review or the study was a single randomized controlled trial, and/or it included nonhuman studies; (3) the systematic review included nonrandomized studies; and (4) the systematic review did not state moderate or strong evidence in support of the study conclusion(s).

**Results:** Of the 6,864 abstracts found in the searches, 6,145 were excluded yielding 719 systematic overviews. Contrary to conventional wisdom, this study identified 719 reviews of randomized controlled trials of therapeutic orthopaedic interventions. The interventions were classified as surgical in 383 (55%), medication in 245 (34%), and rehabilitation in 42 (6%), and other nonsurgical interventions in 39 (5%).

**Discussion:** This study identified many systematic overviews of orthopaedic interventions. The findings of this study could both influence clinical practice and, given the frequency of orthopaedic procedures, have a major public health impact.

Surgeons and patients require evidence to make shared decisions regarding best treatments. Evidence-based medicine is defined as the use of the current best evidence from systematic research.<sup>1</sup> Although clinical

**Figure 1**

Flow chart showing included and excluded abstracts.

decisions must rely on myriad types of evidence and consider patient preferences, the traditional hierarchy of evidence indicates that systematic overviews of randomized clinical trials provide the highest forms of evidence.<sup>2</sup> Identifying quality evidence is an essential component of evidence-based implementation.<sup>3</sup> The purpose of this study was to determine the evidence base for orthopaedics, especially the number and topic of systematic overviews on the effectiveness of orthopaedic interventions.

## Methods

We performed a review of the literature to identify systematic overviews of randomized clinical trials for therapeutic interventions involving orthopaedic surgeons. The search strategy was deliberately broad, and the initial abstract search did not have language restrictions. The search strategies (Appendix 1, <http://links.lww.com/JG9/A46>), with the help of a research librarian, were applied to

PubMed, Ovid Embase, Scopus, and the Cochrane Library for dates of publication from January 1, 2006, to February 3, 2017. In addition, OrthoEvidence<sup>4</sup> was searched for “systematic overviews.” We included reviews where surgeons would be involved in decisions including perioperative care even though anesthetic management of surgically treated patients generally falls under the direct control of the anesthesiologist.

Two reviewers reviewed all identified abstracts independently. Any disagreements were reviewed together and resolved by consensus. Abstracts were excluded based on the following sequentially applied criteria: (1) the systematic review did not describe an intervention for an orthopaedic condition; the intervention was not therapeutic; or the intervention was not likely to be applied or influenced by an orthopaedic surgeon: for example, the intervention was applied in primary care such as injury prevention; (2) the study was not a systematic review (defined as a review of the literature to identify and summarize available studies on a specific therapeutic question) or the study was a single randomized controlled trial, and/or included nonhuman studies; (3) the systematic review included nonrandomized studies; and (4) the systematic review did not state moderate or strong evidence in support of the study conclusion(s).

The full text was reviewed for abstracts that could not be included or excluded based on the information provided in the abstract. In addition to the aforementioned criteria, studies were also excluded if the full text was either not in English or unavailable. For the latter, most were preliminary duplicate or scientific meeting abstracts.

All eligible studies were categorized according to the primary subspecialty: foot and ankle, lower extremity, pediatrics, spine, sports, trauma, upper extremity, and miscellaneous. In some cases, this designation was arbitrary, recognizing that many therapeutic interventions could fall into one or more subspecialties. Finally, interventions were further subcategorized as surgical, medication, rehabilitation, or other nonsurgical interventions.

The review process was performed using Covidence<sup>5</sup> and supplemented by a full-text search using EndNote X8 (Clarivate Analytics).

## Results

The literature reviews identified 6,864 nonduplicate abstracts. Of the 6,864 abstracts, 6,145 were excluded yielding 719 systematic overviews of randomized trials of therapeutic orthopaedic interventions. Most (43%) were excluded because the reviews were not directed toward orthopaedic interventions (Figure 1). The number of systematic overviews published annually increased from 8 in 2006 to 124 in 2016. Appendix 2, <http://links.lww.com/JG9/A47>, provides the 719 studies with the author and date of publication, title, conclusion, and citation. The systematic overviews varied in databases searched, years selected, language exclusions, and methods for the review.

Of the 719 reviews, the subspecialties were categorized as follows: 327 (45%) lower extremity, 149 (21%) trauma, 101 (14%) spine, 58 (8%) upper extremity, 41 (6%) sports related, 23 (3%) miscellaneous, 13 (2%) foot and ankle, and 7 (1%) pediatric. Of the 719 reviews,

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the interventions were surgical in 393 (55%), medication in 245 (34%), rehabilitation in 42 (6%), and other nonsurgical intervention in 39 (5%) (Figure 2).

## Discussion

To determine the evidence base for a surgical specialty, this study used a unique approach by searching the literature for all available systematic reviews of randomized clinical trials. The findings of this study suggest that a body of empirical evidence exists for the effectiveness of many orthopaedic interventions. In contrast to the usual approach of prioritizing a desired practice change based mainly on factors such as the burden of disease and/or cost and frequency of the procedure, this research provides an alternative approach to prioritizing practice change based on those therapeutic interventions with the best evidence.

The lack of high-quality evidence has been cited as a substantial contributor to variation in orthopaedic opinion and practice.<sup>6</sup> Previous research has shown a significant variation in the opinions of orthopaedic surgeons about therapeutic interventions<sup>7,8</sup> and that those opinions are the major modifiable determinant of regional variation in the delivery of orthopaedic procedures.<sup>9,10</sup> Orthopaedic procedures can have a major positive impact on the quality of life.<sup>11</sup> Furthermore, many orthopaedic procedures are expensive and frequent. As such, the underuse or overuse of orthopaedic procedures is a significant public health issue, and the best evidence of their effectiveness and cost effectiveness should be used to influence clinical practice.

For those orthopaedic interventions where systematic overviews exist, the next step from this research are detailed critical appraisals. Content expertise in the topic area, such as the

**Figure 2**

Speciality	Number	%	Intervention				Intervention			
			Operative	Medication	Physio/Rehab	Non Surgical	Operative	Medication	Physio/Rehab	Non Surgical
Lower Extremity	327	45%	131	172	16	8	18%	24%	2%	1%
Trauma	149	21%	129	10	3	7	18%	1%	0%	1%
Spine	101	14%	69	20	8	4	10%	3%	1%	1%
Upper Extremity	58	8%	19	20	8	11	3%	3%	1%	2%
Sports	41	6%	35	2	4	0	5%	0%	1%	0%
Miscellaneous	23	3%	1	16	1	5	0%	2%	0%	1%
Foot & Ankle	13	2%	7	2	2	2	1%	0%	0%	0%
Paediatrics	7	1%	2	3	0	2	0%	0%	0%	0%
<b>Grand Total</b>	<b>719</b>		<b>393</b>	<b>245</b>	<b>42</b>	<b>39</b>	<b>55%</b>	<b>34%</b>	<b>6%</b>	<b>5%</b>

Table of eligible abstracts.

Professional Practice Committee of the British Orthopaedic Association, would be essential in understanding the potential impact of the practice change and factors associated with successful implementation.<sup>3</sup> This review reminds us engaging in practice change, which requires an assessment of those interventions that are supported by evidence. For instance, the targeted change in clinical practice could include a particular intervention such as using tranexamic acid in knee arthroplasty,<sup>12</sup> hip arthroplasty,<sup>13</sup> and spine surgery<sup>14</sup> to reduce postoperative bleeding or a proposed practice change could involve a bundle of evidence-based practices applicable to a group of patients; treatment of elderly patients with hip fractures should consider the evidence for the type of implant,<sup>15</sup> use of closed suction drains,<sup>16</sup> anesthetic choice including pain management,<sup>17</sup> rehabilitation strategies,<sup>18,19</sup> the perioperative medical management,<sup>20</sup> and finally when to start medication to prevent subsequent fractures.<sup>21</sup>

Future research should consider how other specialties compare with orthopaedics or orthopaedic subspecialties in terms of numbers and

types of systematic overviews. Our analysis revealed marked differences in the number of reviews among different subspecialties within orthopaedics. Lower extremity and trauma categories had more overviews compared with the pediatric or foot and ankle categories. The low number of systematic reviews in some subspecialties almost certainly indicates limited numbers of randomized trials in those subspecialties. Among many possibilities, one likely explanation is that the lack of randomized clinical trials may reflect the low volume of procedures in some subspecialties that would make trials logistically less feasible. Higher numbers of clinical trials and systematic overviews in other subspecialties may reflect the interest of researchers and/or funding agencies in high cost and/or frequent procedures. However, leaving aside methodological and logistical issues, the results of this study suggest that further randomized clinical trials could create a greater evidence base for some subspecialties.

Several potential limitations to this study are present. First, the review may not have identified all eligible systematic overviews. However, the literature

search was deliberately broad and searched all major databases, and thus, the number of missed reviews was probably small. Second, the eligible systematic reviews varied in years, language restrictions, and methods. Consequently, identified systematic reviews would require critical appraisal and possibly meta-analysis of the meta-analyses to determine the best clinical practice before embarking on a wide spread clinical adoption. Third, not all identified abstracts had available full texts. However, many of these reviews would have been excluded based on the review of abstracts with available full texts. Finally, we identified systematic overviews, not individual trials. Although individual trials may be important in influencing practice, systematic overviews are generally acknowledged to provide more compelling evidence.<sup>2</sup>

In conclusion, the results of this study identified many systematic overviews relevant to orthopaedic interventions. There is a notable body of evidence for many orthopaedic interventions, which should inform decisions for practice change. The results of this study could both influence clinical practice and have a major public health impact by informing which interventions are supported by evidence and thus warrant consideration for practice change.

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