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What Gets Measured Gets Managed

A Scoping Review of Musculoskeletal Research Conducted Within Practice-Based Research Networks

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Abstract: Musculoskeletal conditions are often managed in primary care settings. To facilitate research and healthcare quality, practice-based research networks offer sustained collaborations between clinicians and researchers. A scoping review was conducted to describe characteristics of practice-based research networks used for musculoskeletal research and musculoskeletal research conducted through practice-based research networks. Practice-based research networks were identified from 1) musculoskeletal-studies identified in OVID Medline, CINAHL, and Embase databases from inception to 5 February 2023 and in ClinicalTrials.gov and 2) from practice-based research network registries and websites. Among active musculoskeletal-focused practice-based research networks (i.e., currently recruiting and conducting research), an assessment of practice-based research network research good practices was performed. After screening 3025 records, 85 studies from 46 unique practice-based research networks met our eligibility criteria. Common conditions studied were low back pain (28%), musculoskeletal conditions not otherwise specified (25%), and osteoarthritis (19%). Thirty-two practice-based research networks (70%) were deemed to be active. Among active musculoskeletal-focused practice-based research networks, best practice data management information was retrievable for most (53%). Because of the scarcity of publicly available information, a large proportion of practice-based research network research good practice items was not assessable. Practice-based research networks have provided an avenue to assess clinical practice and patient outcomes related to musculoskeletal conditions. Further work to increase the transparency of musculoskeletal practice-based research network research practices is warranted.

Key Words: Musculoskeletal, Practice-Based Research Network, Primary Care, Review

(*Am J Phys Med Rehabil* 2024;103:e113–e121)

The 2019 Global Burden of Disease Study lists musculoskeletal (MSK) disorders as the leading contributor to disability worldwide.[1] It is estimated that as many as one in three people suffer from a painful chronic MSK condition globally.[2] Given the high prevalence and disability relating to these conditions, MSK pain is a common reason for care-seeking in primary care.[3,4] Patients with MSK pain primarily seek care within these settings; however, many may not be receiving guideline recommended care.[5] A 2020 systematic review showed less than 20% of low back pain patients visiting a general practitioner received evidence-based information during the consultation, while 25% received referral for diagnostic imaging.[6] Similar practice gaps can be found across various other healthcare professions.[7,8] Improved quality of MSK care offered within primary care settings may be a cornerstone strategy to help reduce the overall burden of MSK disorders.

The quote "What gets measured, gets managed" is commonly attributed to Peter Drucker, an influential thinker in the field of management theory.[9] To improve care, creating a framework to measure how MSK conditions are managed in primary care settings may be considered a first step. Practice-based research networks (PBRNs) are one approach to integrate research with everyday clinical practice to further understand clinical practice patterns and improve healthcare quality.[10,11] PBRNs are defined as groups of ambulatory practices principally devoted to the primary care of patients and affiliated in a common mission to investigate questions related to community-based practice.[12] PBRNs can either take the form of registers, whereby a group of clinicians are connected through a common patient management system, or a substudy format where clinicians opt into research-related activities on an ongoing basis.[13] A 31-item PBRN research

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Author disclosures: This work was internally supported with a grant to the University of Zurich from the Foundation for the Education of Chiropractors in Switzerland. The funders had no role in study conceptualization and design, or in the collection, analysis, interpretation of data, writing of the report, or decision to submit the manuscript for publication. The authors declare no conflicts of interest and no financial incentives were provided. This work has not been previously presented in any form prior to this submission.

Financial disclosure statements have been obtained, and no conflicts of interest have been reported by the authors or by any individuals in control of the content of this article.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.ajpmr.com).

ISSN: 0894-9115
DOI: 10.1097/PHM.0000000000002485

good practice checklist has been developed to assess PBRN best practice and identify areas for improvement.[14]

As MSK conditions are typically first encountered in primary care settings, efforts to understand the capacity of these settings through PBRNs may be a useful step toward improving healthcare quality. However, no comprehensive review has examined MSK-focused PBRNs and MSK-focused research conducted within PBRNs. In light of the increased demand for high-value MSK care, we undertook a scoping review to map the current evidence (specific objectives are provided in study methods) regarding the use of PBRNs for MSK healthcare research.

METHODS

This scoping review was preregistered on the Center for Open Science Framework (https://osf.io/wf7bt/). The design was developed according to methodological guidance of Arksey and O'Malley, incorporating adaptions from Levac et al. and the Joanna Briggs Institute.[15–17] This study follows the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) reporting guidelines (Supplementary File 1, http://links.lww.com/PHM/C359).[18] The following methods are described through the various scoping review framework subsections proposed by Arksey and O'Malley.[15]

Stage 1: Identify the Research Question

The aim of this scoping review was to comprehensively review and evaluate the landscape of PBRNs used for MSK healthcare research. Under this aim, our three specific objectives were as follows:

1. To identify and describe core features of established MSK-focused PBRNs: including name, type/model of PBRN design (registry-based PBRN vs. substudy PBRN model), geographical coverage, membership/healthcare specialty, number of participating clinicians, number of participating clinics, current and past research interests, funding, mission, governance, and website;
2. To identify and describe scientific publications on MSK disorders produced via PBRNs: documenting the research question to be addressed, type of MSK disorder investigated, study design, study population, outcomes, and key findings;
3. To provide an assessment of research practices within active MSK-focused PBRNs according to a 31-item PBRN research good practices checklist.

Stage 2: Identifying Relevant Studies

Selection Criteria

For the purposes of this review, a MSK disorder was defined, consistent with a previous scoping review on MSK disorders,[19] as any form of arthritis (e.g., rheumatoid arthritis, osteoarthritis, gout), autoimmune rheumatic condition (e.g., systemic lupus erythematosus), regional specific or nonspecific MSK condition, fracture, and osteoporosis. MSK-focused healthcare practitioners were defined as chiropractors, physiotherapists, sports medicine physicians, rheumatologists, orthopedic surgeons, physiatrists, occupational therapists, osteopaths, and massage therapists. PBRNs were classified as "MSK-focused" if they (1) included a clinician roster list of more than 50% of MSK healthcare practitioners, or (2) focused on answering MSK-specific research question.

PBRNs were conceptualized—in accordance with the Agency for Healthcare Research and Quality (AHRQ) definition—as "a group of 15 to several hundred primary care practices/primary care clinicians devoted principally to the care of patients, united by a shared commitment to expand the science base of clinical care and often affiliated with academic or professional organizations. This includes an ongoing member commitment to network activities, a structure which transcends a single project or study."[12] For the purposes of this scoping review, "clinician commitment to ongoing network activities" also included nonsubstantial scientific contributions such as participation in patient recruitment and data collection. PBRNs are described as either taking the form of a register-based model or a substudy model. In register models, initial data collection is focused on establishing a centralized coordinated patient record management system across all participating clinics. While in substudy PBRN models, initial data collection is focused on practitioner-relevant information collected via self-report aimed at establishing a practitioner database.[13] This scoping review included peer-reviewed descriptive papers and protocols on the development of MSK-focused PBRNs. Randomized controlled trials, nonrandomized trials, prospective and historical cohort, case-control, cross-sectional, consensus-based, and qualitative studies were also included. Further information on the inclusion and exclusion criteria used can be found in Supplementary File 2 (http://links.lww.com/PHM/C359).

Records were excluded if they: 1) did not self-identify as a PBRN or a study conducted within a PBRN, or if it was not possible to determine PBRN eligibility according to our conceptualization above through published reports or from PBRN web material; 2) were conducted within practice-based settings that did not adhere to the definition of a PBRN (i.e., less than 15 clinicians or practices devoted to patient care, not an ongoing member commitment to network activities, not a structure that transcends a single project or study); 3) included participants for whom information on MSK disorders were not provided; and 4) were only available as a conference abstract.

Search Strategy

A preliminary search strategy was developed and tested with a research librarian in OVID Medline from inception to 7 December 2022 for MSK studies conducted in PBRNs, using search terms identified from relevant concepts of "practice-based research" and "musculoskeletal disorders." Words contained in the titles and abstracts along with index terms of relevant papers identified in the preliminary search and extensive search strategy testing informed the specification of a final search strategy. For the full search, we examined OVID Medline, CINAHL, and Embase from inception to 5 February 2023, with no restriction on language. The specific search terms used are listed in Supplementary File 3 (http://links.lww.com/PHM/C359) In addition, ClinicalTrials.gov and the PBRN registry of the AHRQ were searched for relevant records. Reference lists of relevant captured systematic/scoping reviews were examined and key PBRN leaders contacted to provide additional relevant records (see registered protocol for details).

Step 3: Study Selection

All identified records were uploaded to the online Covidence software (www.covidence.org). Titles and abstracts were screened

for eligibility by two reviewers independently (RL and another from JML, JK, LH, AKur). Full-text screening of potentially relevant records was also conducted independently by two reviewers (RL and another from JML, JK, LH, AKur). Discordant decisions during the screening and full-text analysis were resolved consensus and arbitrated by a third reviewer (CAH), if needed.

Stage 4: Charting the Data

Prespecified standardized charting tables were used to tabulate evidence relating to the specific scoping review research objectives. Data extraction was initially performed by one reviewer (RL), checked independently by a second reviewer (JK), and independently checked again by a different reviewer (another from JML, LH, AKur). Discrepancies were resolved by consensus. MSK-focused PBRNs and non-MSK-focused PBRNs (e.g., dental and family medicine focused) were subsequently identified from these eligible records and studies. If further information was required to fully describe the PBRNs, we emailed PBRN directors/coordinators up to three times. Information from directors/coordinators was primarily required to determine current active PBRN status. Active PBRNs were defined as those which were still conducting studies and/or recruiting clinician members. PBRN activity status was determined from PBRN websites, PBRN web links, affiliated university websites, published white papers, and through consultation with PBRN directors/coordinators.

Assessment of PBRN Best Practices

An assessment of PBRN best practices was conducted on each identified active MSK-focused PBRN. The assessment was performed using the 31-item PBRN good research practice checklist, a self-assessment tool for PBRNs to identify strengths and weaknesses in their own research practice.[14] The 31 items span across the domains of data management, study supervision, PBRN policies, study management, and ethical considerations. Because this checklist is primarily used for PBRN internal audits, we adapted the checklist column headers (i.e., rating categories) to account for missing information that was not publicly available or retrievable. The item rating categories were changed from "PBRN does this well," "PBRN has a standard operating procedure," "Area to improve," and "Priority: low; medium; or high" to "PBRN does this," "Unclear," "PBRN does not do this," and "Unable to judge." Assessment of PBRN best practices was performed by one reviewer (RL) using the following three sources of information: 1) information on the PBRN within records eligible for our review; 2) PBRN website and information posted on the website; and 3) information posted about the PBRN on the AHRQ PBRN registry search page.

Stage 5: Collating, Summarizing, and Reporting Results

Information was collated in table form. We reported 1) the characteristics of MSK-focused PBRNs (include PBRN membership of >50% of chiropractors, physiotherapists, sports medicine physicians, rheumatologists, orthopedic surgeons, physiatrists, occupational therapists, osteopaths, massage therapists; or general medicine PBRNs, which focus only on studying MSK disorders); 2) characteristics on non-MSK-focused PBRNs that have conducted MSK specific research; and 3) summary of all studies collected in this review, which were used to subsequently identify relevant PBRNs. Results were summarized qualitatively.

Deviations From Protocol

We deviated from the registered protocol (https://osf.io/wf7bt/) by not including published abstracts in this report. Given that no previous review has assessed the use of PBRNs for MSK health research, we were initially overly inclusive to capture sufficient information. This decision was also based on a previous review on PBRNs in complementary health, which assessed 81 records at the full-text stage. However, at the full-text stage, we assessed 198 records. Given this amount of potentially relevant literature, a pragmatic decision was made not to include published abstracts. A second protocol deviation occurred regarding the quality assessment of PBRN best practices using a proposed modification of the 31 item best practice checklist. This assessment was initially to be conducted in duplicate. However, this checklist is often used for PBRN internal audits, and publicly available information on many of the checklist items is scarce. Because the feasibility of reaching consensus would have been compromised by the scarcity of publicly available information on checklist items, we opted to provide this assessment of PBRN research good practices by a single reviewer.

RESULTS

Search Results

We identified 3025 unique records through our search strategy. Of these, 2827 were excluded after title and abstract screening. Of the remaining 198 potentially relevant records, 114 were excluded after full-text screening and analysis. The most common reasons for record exclusion after full-text analysis were ineligibility due to wrong condition—not MSK ($n = 47$) and ineligibility due to wrong context—not conducted within a PBRN ($n = 37$). Additional reasons for exclusion after full-text analysis can be found in Supplementary File 4 (http://links.lww.com/PHM/C359). Two relevant systematic review reference lists were hand searched for additional articles, with one article included.[20,21] A total of 46 unique PBRNs were identified from 85[22–106] published studies that met our review eligibility criteria. Figure 1 provides the PRISMA scoping review flow diagram.

Features of MSK-Focused PBRNs

A total of 53 studies were conducted within 25 MSK-focused PBRNs.[22–74] The PBRNs were established between the years of 1991 and 2021, with 8 (32%) established within the last 10 yrs. PBRNs were located across Australasia ($n = 4$), Europe ($n = 8$), and North America ($n = 9$), while 5 MSK-focused PBRNs were international (1 PBRN had both a local and international presence). With regard to healthcare speciality, 7 PBRNs focused on chiropractic, 5 on surgery, 4 on osteopathy, and 3 on rheumatology. Other professions represented in MSK-focused PBRNs included massage therapy, athletic therapy, physiotherapy, and family medicine networks focused on spine and low back–related pathologies or complaints. Size of PBRN membership ranged from 22 clinicians to 3500 clinicians. With regard to PBRN type, 16 (64%) were

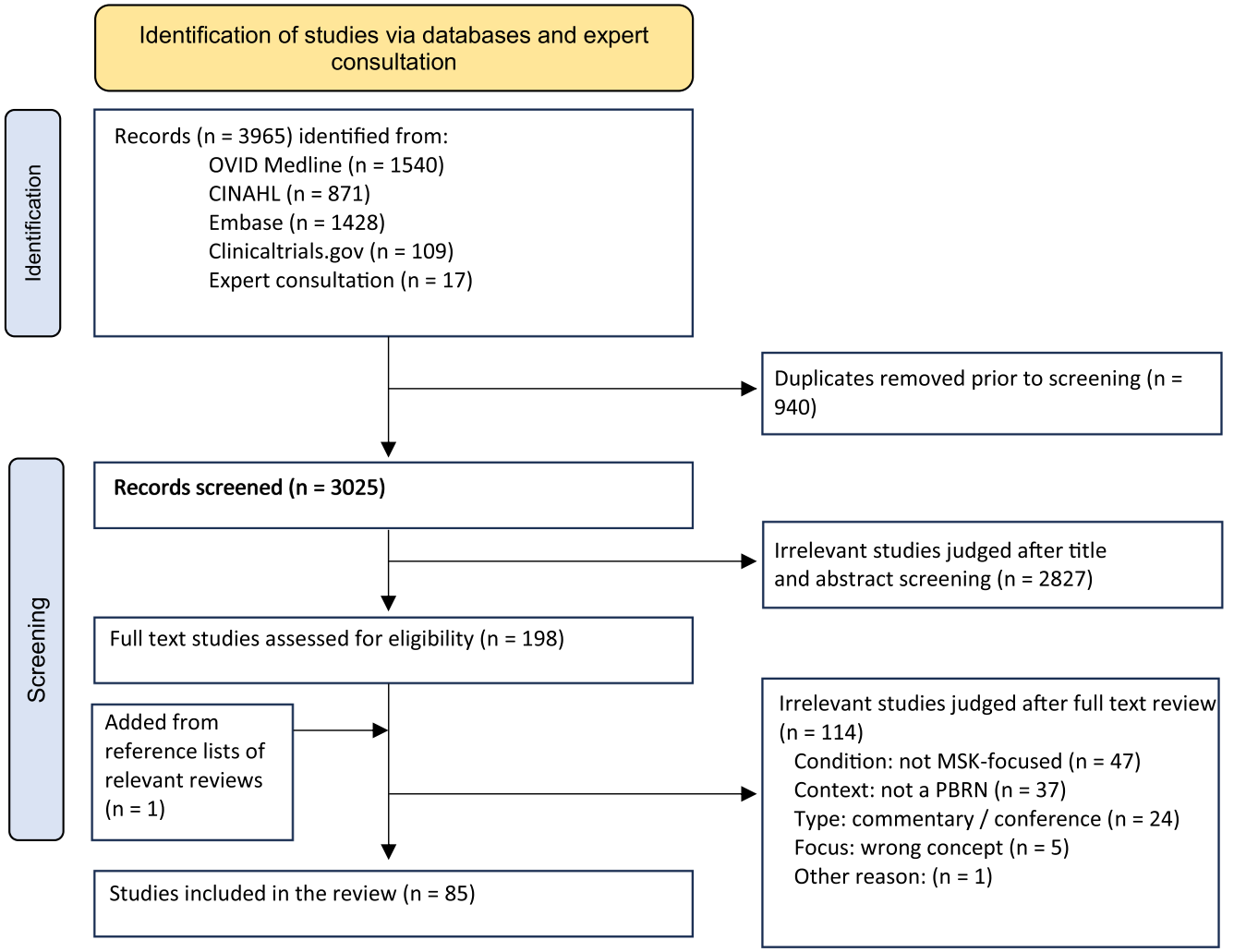

FIGURE 1. Study inclusion and flow diagram.

substudy based while 9 (36%) were registry-based PBRNs. A majority of the substudy PBRNs (81%, *n* = 13) were established through complementary healthcare professions (chiropractic, osteopathy, massage therapy). Overall, 17 PBRNs (68%) were still active, while 8 (32%) were not active. Seven of the 8 (88%) inactive PBRNs were established ≥10 yrs ago. All the PBRNs, which were no longer active, showed 2 or fewer funding sources, with only 1 receiving a national public grant. The remaining 8 were either funded through private donors/foundations or through a healthcare professional association. Table 1 provides a short overview of MSK-focused PBRNs and Supplementary File 5 (http://links.lww.com/PHM/C359), provides a full overview of MSK-focused PBRNs.

Studies From MSK-Focused PBRNs

Of the 85 studies included in our review, 53 (62%) were conducted by MSK-focused PBRNs.[22–74] The majority of these studies used cross-sectional designs (*n* = 25; 47%),[22–28,33,35,36,45,50–52,57,60–68,73] followed by prospective cohorts (*n* = 13; 25%),[29–32,34,37–39,42,53,54,69,74] and retrospective cohorts (*n* = 7; 13%).[40,47,48,55,56,58,71] Other study designs included before-and-after, mixed method, and qualitative studies.[41,44,46,49,59,70] We found no randomized controlled trials conducted from MSK-focused PBRNs. Most studies focused on general (unspecified) MSK conditions (*n* = 17),[22,23,26,27,35,37,50,51,57,60–64,67,72,73] low back pain (*n* = 16),[25,29–34,42,43,46,49,53,54,59,69,70] osteoarthritis (*n* = 9),[38–41,44,45,47,48,68] and rheumatic MSK conditions (*n* = 4).[28,55,56,74] Additional MSK conditions explored included fracture, headache (tension-type), lumbar spinal stenosis, scoliosis, and tendinopathy.[24,36,52,58,66] Patient outcomes were the primary focus of 27 studies (51%), with the remaining studies focused on either clinician outcomes (*n* = 18) or patient and clinician outcomes together (*n* = 8). Supplementary File 6 (http://links.lww.com/PHM/C359), provides an overview of studies conducted from MSK-focused PBRNs.

Features of General Medical and Non-MSK-Focused PBRNs

Thirty-two studies were identified from 21 general medical or non-MSK-focused PBRNs.[75–106] The establishment of these networks ranged from the years of 1973 to 2012. None of these general medical PBRNs were therefore established within the last 10 yrs. The PBRNs were located across the USA (*n* = 10), the UK (*n* = 5), the Netherlands (*n* = 3), Australia (*n* = 2), and

TABLE 1. Brief overview of MSK-focused PBRNs

Name (Year Established, Location)	PBRN Type, Activity	Specialty (Size)
ACORN (2015, Australia)[22–26]	Substudy, not active	Chiropractic (n = 1680)
AT-PBRN (2009, USA)[27]	Register, active	Athletic therapy (n = 60, 45 clinics)
CARRA (2009, USA and Canada)[28]	Register, active	Rheumatology (n = > 550, 60 clinics)
Center for Outcome Studies PBRN (1991, USA)[29–34]	Substudy, not active	Chiropractic and Primary care medicine (n = 171)
CONCORD-PBRN (2010, USA)[35]	Substudy, not active	Osteopathy (n = 16 clinics)
CSRN (2012, USA)[36]	Substudy, not active	Chiropractic (n = 55, 40 clinics)
Danespine (2009, Denmark)[58]	Register, active	Orthopedic and neurosurgery (n = 17 clinics)
DO-TOUCH NET (2009, USA)[37]	Substudy, active	Osteopathy (n = 107, 82 clinics)
GLA:D® (2013, Denmark/International)[38–49]	Register, active	Chiropractic and physiotherapy (n = > 1000, >400 clinics)
ICPA PBRN (2008, USA)[50,51]	Substudy, active	Chiropractic (n = 3500, 3500 clinics)
IHFRC (2005, International)[52]	Substudy, not active	Orthopedic Surgery (n = 310)
KIP (2009, Denmark)[53,54]	Substudy, active	Chiropractic (n = 36, 19 clinics)
METEOR (2006, International)[55,56]	Register, active	General Medicine (n = 128 clinics)
MNO-PBRN (2014, USA)[57]	Substudy, not active	Massage therapy (n = 68, 68 clinics)
NORspine (2007, Norway)[58]	Register, active	Orthopedic and neurosurgery (n = 36 clinics)
Nova Scotian Chiropractic PBRN (2016, Canada)[59]	Substudy, active	Chiropractic (n = 24)
ORION (2016, Australia)[60–66]	Substudy, active	Osteopathy (n = 992)
ORC-NZ (2016, New Zealand)[63]	Substudy, active	Osteopathy (n = 253)
PRACI (2014, Australia)[67,68]	Substudy, active	Complementary medicine (n = 764 (59% massage therapy))
REIDE (2002, Spain)[69]	Substudy, not active	Family medicine (n = 75, 40 clinics)
Renodos back pain network (2009, France)[70]	Substudy, not active	Specialized spine medicine (n = 22, 7 clinics)
Spine Tango registry (2002, International)[71]	Register, active	Specialized spine medicine (n = 159 active user accounts)
Swespine (1998, Sweden)[58]	Register, active	Orthopedic and neurosurgery (n = 47 clinics)
Swiss chiropractic PBRN (2022, Switzerland)[72,73]	Substudy, active	Chiropractic (n = 152, 110 clinics)
SRQ (1995, Sweden)[74]	Register, active	Rheumatology (n = 56 clinics)

Belgium (n = 1). Most (n = 19) of the professions represented included family medicine or a mixed family medicine network (whereby at minimum 50% is a family medicine practitioner). Other professions represented include integrative medicine (n = 1)[76] and dentistry (n = 1).[101] PBRN size ranged from 17 clinicians (family medicine PBRN in the Netherlands) to approximately 7000 clinicians (dental PBRN in the USA). Fourteen (67%) of the general medical and non-MSK-focused PBRNs were substudy-based PBRNs, while 7 (33%) were registry based. Fifteen PBRNs were of active status, while 6 were not active. All inactive PBRNs were established ≥10 yrs ago. Supplementary File 7 (http://links.lww.com/PHM/C359) provides an overview on general medical and non-MSK-focused PBRNs. Figure 2 provides locations of MSK-focused and non-MSK focused PBRNs captured in this review.

Studies From Non-MSK-Focused PBRNs

A total of 32 studies were conducted from non-MSK-focused PBRNs.[75–106] Common study design types included cross-sectional studies (22%, n = 7),[83,90–92,100–103] retrospective cohort studies (16%, n = 5),[44–46,51,54] prospective cohort studies (13%, n = 4),[82,104–106] and randomized controlled trials (13%, n = 4).[86,87,95,98] Other study designs included qualitative studies, within-trial evaluations, self-controlled case series, before-and-after studies, quasi-experimental studies, and non-randomized trials.[75,80,89,93,94,96,97,99] Studies focused on a variety of MSK conditions including low back pain (n = 8),[85–87,89,95–97,100] osteoarthritis (n = 7),[75,81,82,88,92,98,102] and MSK unspecified (n = 4).[76,78,99,103] Other MSK conditions included gout,[77,83,84] rheumatoid arthritis, spondylarthritis, and systemic lupus erythematosus,[80] neck pain,[91] juvenile idiopathic arthritis,[101] and fracture.[79,104–106] Twenty-seven (84%) studies from non-MSK-focused PBRNs were focused on patient outcomes.[75–80,82,84–96,98,100,102–106] Supplementary File 8 (http://links.lww.com/PHM/C359), provides an overview of studies conducted from general medical and non-MSK-focused PBRNs.

PBRN Research 31 Item Best Practice Checklist

Ten items pertaining to the PBRN best practice checklist factor 1 ("data management") were assessed.[14] Fifty-three percent of the active MSK-focused PBRNs provided complete information for most (≥50%) "data management" items. PBRNs where a proportion of "data management" information was unable to be judged were ICPA PBRN (80%), Nova Scotian PBRN (70%), ORION (70%), ORC-NZ (70%), and PRACI (70%). Four items of the best practice checklist factor 2 ("study supervision") were assessed.[14] Four (24%) PBRNs reported information on most "study supervision" items. Nine items of the best practice checklist factor 3 ("PBRN policies") were evaluated.[14] Only 2 (12%) PBRNs provided complete information on most "PBRN policies" items—both being register-based PBRNs. Five items of the best practice checklist factor 4 ("study management") were assessed,[14] of which only 1 PBRN provided complete information on most. Three items of the best practice checklist factor 5 ("ethical considerations") were evaluated.[14] In 14 PBRNs (82%), we were unable to make a judgment on "ethical

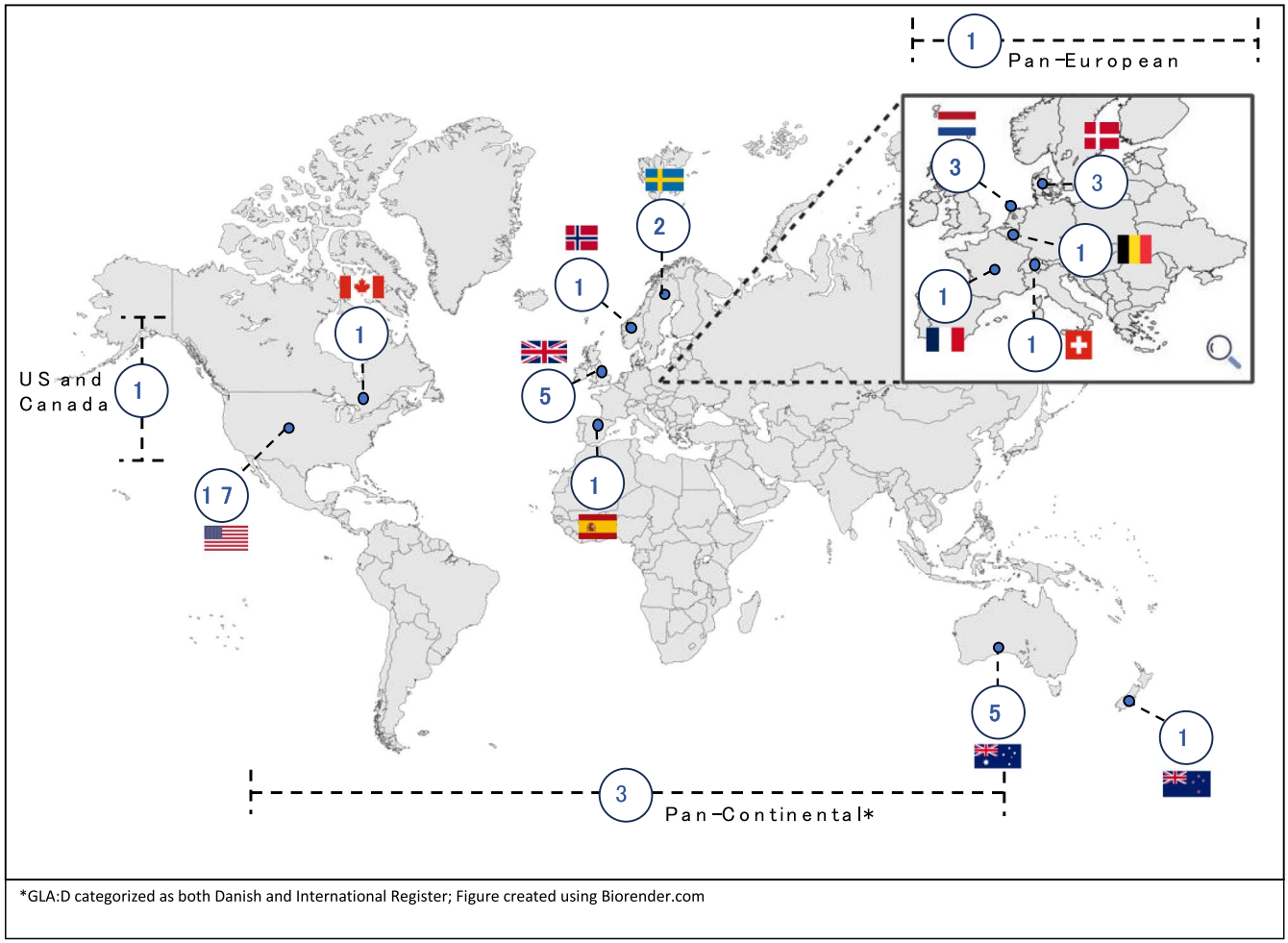

FIGURE 2. Location of PBRNs, which have contributed to MSK healthcare research.

considerations" items due to insufficient information. Supplementary File 9 (http://links.lww.com/PHM/C359), provides the preliminary assessment for each active MSK-focused PBRN.

DISCUSSION

Our scoping review provides a characterization of PBRNs involved in MSK research and studies conducted from PBRNs with a MSK-focus. We found a total of 85 studies, which were conducted from 46 unique PBRNs. Fifty-three studies were conducted from 25 MSK-focused PBRNs, while 32 studies were identified from 21 general medical and non-MSK-focused PBRNs. The most common conditions studied within the context of PBRNs were low back pain (28%), unspecified/general MSK conditions (25%), and osteoarthritis (19%). Because of the lack of publicly available information, we were unable to ascertain many of the items on the PBRN research best practice checklist—especially in the categories of "study management" and "ethical considerations."

Of the 46 PBRNs identified in this review, 8 were established within the last 10 yrs. Interestingly, all 8 of these PBRNs were developed by complementary health professions. There seems to be more recent interest in the development of new complementary health PBRNs involved in MSK research. This includes chiropractic PBRNs (ACORN,[22–26] GLA:D,[42,43,46,49] Nova Scotia chiropractic PBRN,[59] Swiss chiropractic PBRN[72,73]), massage therapy focused PBRNs (MNO-PBRN,[57] PRACI[67,68]), osteopathy PBRNs (ORC-NZ,[63] ORION[60–66]), and physiotherapy PBRNs (GLA:D[38–41,44,45,47,48]). PBRNs have therefore emerged as potential solutions to address practice-based research gaps particularly within complementary health professions that manage MSK complaints. We examined a total 85 studies of which 71% were published within the last 10 yrs. This is in line with a larger trend of increased PBRN research in recent years.[107] The most common MSK conditions studied in PBRNs mimicked the most common reasons for MSK primary care seeking. This included low back pain, general/unspecified MSK complains, and osteoarthritis.[4] Conversely, neck pain, a highly prevalent MSK condition in primary care was only studied in 2 reports.[65,91] It is possible that more studies were conducted by the PBRNs described but were not included in this review because of the network setting not described or omitted within primary studies.

A major challenge for PBRNs is long-term viability and sustainability.[108,109] In our review, we identified a sizable proportion (30%) of PBRNs that were no longer active. We were only able to identify a single funding source in 12 of the 14 PBRNs that were now inactive. This highlights the need for diverse avenues for PBRN funding. PBRNs typically require

stable financial support for infrastructure and project support.[109] Annual infrastructure costs for a basic PBRN with part-time support staff have been estimated at a minimum of $70,000 USD.[110] Recommendations to improve financial viability may comprise of the inclusion of external organizations and funding agencies, which share in the PBRNs mission onto the PBRN advisory board, membership dues for members, devotion of academic staff to grant writing, and the identification of potential charitable donors.[107,109]

PBRNs either collect information using a substudy or registry-based format. We found that the majority of the PBRNs (65%) were developed using a substudy format. Substudy-based PBRNs are traditionally seen as a more flexible and decentralized approach to data collection as they do not follow strict electronic infrastructure requirements.[13] In this review, MSK studies conducted from substudy PBRNs were more diverse than those from register-based PBRNs. This included 4 randomized controlled trials from 2 different PBRNs[86,87,95,98] and 2 qualitative studies from 2 PBRNs.[59,99] However, half of studies published from substudy PBRNs were cross-sectional in nature. Therefore, there is need to further assess the feasibility of conducting research using varied study design in many of the identified MSK PBRNs in this review.

As PBRNs conduct research in decentralized community settings, quality control challenges with regard to research integrity exist.[14] The PBRN 31 item good practice checklist is one way for PBRNs to self-assess areas for improvement.[14] Our external assessment of good clinical research practices of active MSK PBRNs was limited because of a lack of publicly available information. However, most PBRNs provided complete information for at least half of the items relating to the category of "data management." The three spine registries of DaneSpine, SweSpine, and Spine Tango provided the most complete information with 70%–80% of all "data management items" reported.[58,71] Generally, we were able to assess more items and found increased transparency in register-based PBRNs.

Strengths

Our review has several strengths. We consulted with an experienced librarian to develop a systematic search strategy and prospectively registered a publicly available study protocol. We performed a comprehensive search of 3 electronic databases without limitations in year. Gray literature sources were also searched through ClinicalTrials.gov and the website of the AHRQ. Title and abstract screening, full-text screening, and data extraction were performed independently and in duplicate.

Limitations

Our review also has limitations. First, the broad AHRQ definition of a PBRN creates potential for misclassification with identifying PBRNs and PBRN studies. No specific examples of clinician network activities to constitute PBRN membership are provided within this definition. As a result, networks where clinicians contribute heavily to scientific tasks and those where clinicians perform more rudimentary research tasks (i.e., data collection within a patient register) may both be interpreted as meeting the AHRQ PBRN definition. It is likely that more studies were conducted by PBRNs but were not included in this review because of the network setting not described or omitted within primary studies. This questions if the definition used was optimal and points to the need for a clearer PBRN definition. Our search focused on studies, which self-identified as being produced from a PBRN or from a community network of clinicians. However, not all studies conducted from these networks may self-identify as such, particularly if clinician involvement focused on nonscientific tasks such as data collection. For example, only 2 studies were identified from the GLA:D registries in the electronic search (additional studies were found on the GLA:D website and by expert consultation). Second, because we identified PBRNs primarily through publications, we may have missed those, which have yet to publish peer-reviewed literature. For example, our search did not capture the Swiss National Joint Registry (SIRIS)—a hospital and outpatient clinic-based healthcare quality improvement initiative for joint surgeries involving more than 150 clinics in Switzerland.[111] Third, we modified our original protocol with regard to the exclusion of abstracts and duplicate application of the PBRN best practice checklists. Fourth, we were unable to perform a more rigorous duplicate assessment of PBRN best practices largely because of scarce publicly available information in MSK-focused PBRNs.

CONCLUSIONS

Several PBRNs have provided an avenue to assess clinician practice patterns and patient outcomes related to MSK pain in primary care. As a result, they hold merit and have been used for quality assessment initiatives. Given the need for MSK primary care quality improvement, further work to increase the transparency, quality, and value of MSK primary care PBRN research practices is warranted.

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