

## A Semi-systematic Review of Patient Journey for Chronic Pain in Saudi Arabia to Improve Patient Care

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### Abstract

This semi-systematic review aimed to quantitatively map and identify data gaps in patient journey touchpoints for chronic low back pain (CLBP) and osteoarthritis (OA) in Saudi Arabia. An evidence mapping approach was used to quantify the prevalence and distribution of different touchpoints including awareness, screening, diagnosis, treatment, adherence and control across CLBP and OA patient journeys. A systematic search of databases MEDLINE, Embase and BIOSIS was conducted using predefined inclusion criteria to identify relevant studies published in English between 01 January 2010 and 11 December 2019. A substantive unstructured literature search was also conducted on public or government websites with no date restriction. To address data gaps, anecdotal data were also considered for inclusion. Data combined from all sources was synthesized and presented as simple or weighted mean. Of the 47 records identified, five studies met the inclusion criteria. The overall prevalence of CLBP from three studies was estimated at 8%. The prevalence of OA as per anecdotal data was 30%. Awareness of OA, based on two published studies and anecdotal evidence was 48%. According to anecdotal evidence, screening and diagnosis of OA was 50% and 60%, respectively. The majority of patients with OA (80%) were treated, with higher adherence (90%), of which 60% of patients showed symptoms control. The study findings highlight the need for more evidence-based research related to common patient journey touchpoints, which in turn may aid in efficient resource utilization, innovative pain services and collaborative practices to improve patient outcomes at national level.

**Keywords:** chronic low back pain (CLBP), evidence map, osteoarthritis (OA), patient journey, prevalence, Saudi Arabia.

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### INTRODUCTION

Chronic pain has been recognized as the most common, disabling, and persistent or recurrent clinical problem that lasts for more than three months [1, 2]. It is primarily characterized by low back pain (LBP) and osteoarthritis (OA) and often associated with other indications such as temporomandibular disorders, irritable bowel syndrome, chronic widespread pain and neuropathic pain conditions [3]. LBP is characterized by muscle stiffness and tension, which is confined between the costal margin and inferior gluteal folds [4]. On the other hand, OA is a chronic degenerative disorder caused by abnormal bone changes and loss of cartilage in the joints, ultimately resulting in stiffness, pain and impaired movement [5]. LBP and OA being the most prominent causes of chronic pain conditions,

impairs health-related quality of life and increases health-care resource utilizations and associated costs in affected individuals [6-10].

According to the recent Global Burden of Disease Study, LBP contributes to 7.4% of total global years lived with disability (YLDs), affecting 568 million people worldwide. Similarly, OA is responsible for 2.2% of global YLDs that affects >500 million people worldwide [11]. The prevalence of chronic pain in Saudi Arabia was 46.4% and mostly linked with chronic back pain or LBP [12]. The overall prevalence of OA in Saudi Arabia was estimated at 15.3% among the general population [13].

Although several clinical practice guidelines exist for LBP management [14], these have not resulted in major changes in clinical practice outcomes. The application of screening tools has been proposed for prevention of pain progression and designing effective care strategies for management of chronic low back pain (CLBP) and OA [15-17]. Further, patients with LBP expect clear, consistent and personalized information on prognosis, treatment options and self-management strategies [18]. The World Health Organization (WHO) has acknowledged the need for delivering better health outcomes by developing a framework on “integrated people-centered health services” to help countries improve the efficiency and effectiveness of the needs of people at the core of their health-care functioning [19]. A patient-centered approach, that is, to pursue the patient values, especially in the domains of diagnosis and driving clinical decisions, is essential to improve health outcomes [18, 20].

With rising concern over the ineffectiveness of traditional approaches to manage chronic pain symptoms, global efforts are evolving to support and demonstrate the biopsychosocial approach toward comprehensive pain management [21]. However, there is limited evidence available in terms of patient-centric outcomes in the Middle East [22]. There is also lack of reliable studies to estimate the prevalence of chronic pain indications among the general population of Saudi Arabia [23]. In general, this constraint is consistent regarding the availability of patient-related data in Saudi Arabia [24]. Individual studies, clinical trials and systematic reviews are often limited to particular types of pain and focus on different types of interventions [25, 26]. Therefore, it remains a great challenge to interpret the cultural character, traditional influence, patient's attitudes and behavioral compliance toward the evaluation, treatment and conviction of chronic pain symptoms in Saudi Arabia [27]. The burden of socioeconomic development with ever-increasing expectations from the country's health-care system often leads to patient dissatisfaction regarding pain-related services [12].

Limited access to quality research evidence and synthesis of literature are considered to be the most prominent hindrance for policy and clinical decision-making in a timely manner [28]. Evidence mapping is an emergent approach to overcome these barriers, acknowledge the gaps from scientific evidence to inform future research priorities and prioritize the importance of these topics in health organizational policy implementation [25, 29]. Mapping the patient journey touchpoints typically categorized as awareness, screening, diagnosis, treatment, adherence and control for patients with chronic diseases is also essential to understand patients' perspective at each phase enabling patient-centered values in the health-care system [30].

We, thus, aimed to synthesis the available data on the prevalence of CLBP and OA, and quantitatively map and identify gaps across the patient journey touchpoints that can aid in decision-making and better patient outcomes in Saudi Arabia.

## METHODS

### Study design

This study used evidence mapping and semi-systematic data review approach based on a systematic literature search combined with unstructured search and anecdotal data in the local context. It is followed by validation, synthesis and quantitative mapping of the prevalence data and different patient journey touchpoints in terms of disease awareness, screening and diagnosis, treatment, adherence and control for chronic pain indications, CLBP, and OA in Saudi Arabia. This current review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [31], with minor modification in line with the scope of this study. The methodological approach for this study has been described in detail elsewhere [32].

Six steps were used to construct the evidence map: (1) developing a comprehensive search strategy; (2) establishing the inclusion and exclusion criteria; (3) screening and shortlisting; (4) supplementing with additional and/or local data; (5) data extraction and synthesis; and (6) evidence mapping.

### Structured search

The structured search was conducted in three electronic databases including MEDLINE, Embase and BIOSIS using medical subject headings (MeSH) terms and keywords for CLBP and OA combined with search terms related to prevalence and patient journey touchpoints. Studies published in English language from 01 January 2010 to 11 December 2019 were included. The search was designed to include all studies related to CLBP and OA conducted in Saudi Arabia. The full search strategy is presented in Supplementary Table 1.

### Unstructured search

To address data gaps in structured search, unstructured search was conducted in the Incidence and Prevalence Database (IPD), the World Health Organization (WHO) website, National Ministry of Health for Saudi Arabia, including national clinical practice and treatment guidelines, and Web search engines (the search included a combination of the key MeSH terms from the systematic literature search, with no restrictions on date limits identified in the additional searches).

### Inclusion and exclusion criteria

Studies were eligible for inclusion if they were: (i) peer-reviewed published systematic review and/or meta-analysis, randomized controlled study, observational study and narrative reviews; (ii) focused on adult human population aged  $\geq 18$  years; (iii) reporting quantitative data from the patient journey touchpoints for CLBP and OA, which includes awareness, screening, diagnosis, treatment, adherence and control; (iv) studies conducted on patient populations with chronic pain conditions, which is characterized as any pain continuing for longer than 3 months [2], focusing exclusively on LBP and OA.

Studies published before 2010, languages other than English, case studies, letters to the editor, studies with specific patient subgroups, and duplicate records were excluded. Additional criteria were considered to shortlist studies as the emphasis was evaluation of the mapping scope and not limited to the application of concept. This comprehensive search strategy was followed to minimize the risk of missing relevant literature and avoid significant unrelated studies.

### Study selection

Both structured and unstructured searches were conducted by an independent reviewer by screening titles and abstracts of each study for relevance. A second independent reviewer assessed these search results based on study title, article citation, author names, year of publication, abstract, study design, study participants and study setting for their inclusion against the eligibility criteria, and any disagreements were reconciled by discussion among reviewers. To account for the unavailability of relevant studies at the national level with sample size  $\geq 500$ , studies within a domain of a population subgroup, single-center experience, or studies with sample size  $< 500$  were considered appropriate for inclusion. Furthermore, to supplement and address the data gaps in the published literatures, data from the anecdotal evidence were also included.

### Data extraction

After manual screening, relevant data from the included articles were exported to Microsoft Excel for data extraction, followed by synthesis. Following the calibration of the evidence, two reviewers extracted data on (1) title of the article, (2) article citation, (3) authors, (4) year of publication, (5) abstract, (6) population characteristics, (7) sample size, (8) prevalence of each indication in the sub-population and (9) quantitative categorization of each patient journey touchpoint such as awareness, screening, diagnosis, treatment, adherence and control, defined according to the authors (Supplementary Table 2).

### Patient journey mapping

The overview of included studies is shown in Table 1. All abstracted data were reviewed and verified to ensure consistency of data in health-care context related to patient journey touchpoints for CLBP and OA. The display of evidence, in terms of patient prevalence, and estimation of each patient journey touchpoint were synthesized using appropriate measures of central tendency (eg, weighted mean or simple average), and a summary of outcomes is visually presented in the form of a map and a tabular summary of outcome results.

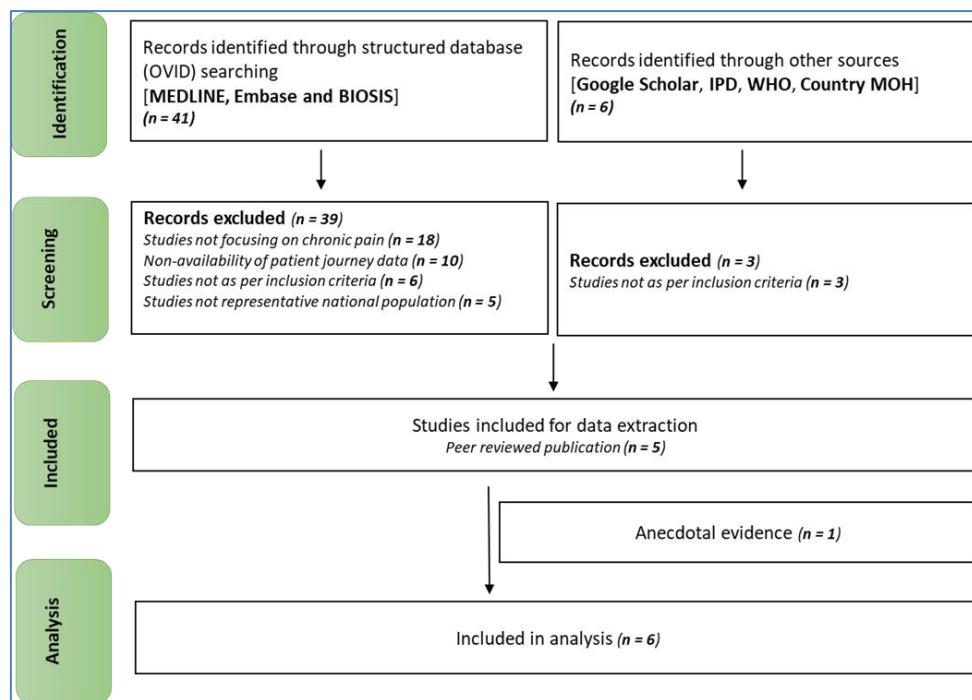
### Ethical consent

Approval from the Ethics committee is not required as this review is based on previously conducted studies and is restricted to the analysis of secondary data.

## RESULTS

### Search results

Database searches retrieved 47 articles, with 41 of them coming from the structured search and six from the unstructured search. Finally, five articles met the inclusion criteria after manually screening the available literature. Most studies were excluded for not focusing on chronic pain ( $n = 18$ ) and non-availability of patient journey data ( $n = 10$ ). Additional reasons for exclusion comprised studies that were not as per inclusion criteria ( $n = 9$ ) and population not being nationally representative ( $n = 5$ ). The literature search and study selection process are summarized in Figure 1.

**Fig-1: Flowchart of literature search results.**

IPD, Incidence and Prevalence Database; MOH, Ministry of Health; WHO, World Health Organization

**Description of the included studies**

All the included studies were cross-sectional in design and were published within the last four years. Of the five studies, three studies indicated the prevalence of CLBP in which one enrolled a selected population (surgeons of different specialties in Taif city) of Saudi Arabia (*n* = 141) [23], another recruited (*n* = 1031) participants from Al-Kharj, Saudi Arabia [33], and the third was a cross-sectional online survey from different regions of Saudi Arabia (*n* = 26,372) [12]. Two studies evaluated the awareness of OA in Saudi Arabia, while a study that included participants (*n* = 930) from different

regions of Saudi Arabia reported moderate awareness (36.2%) [34]; the other study that included participants (*n* = 1052) from different cities in Aseer region revealed a higher awareness rate (82.6%) regarding knee OA [35]. For addressing data gaps in OA at the national level, anecdotal data was collected by organizing an interview with Dr. Sami Bahlas (unpublished) using the patient journey touchpoints definitions. Subsequently, data provided by Dr. Sami Bahlas was verified and included upon mutual consensus. Additional study characteristics are presented in Table 1.

**Table-1: Overview of Included Studies**

Title: First Author; Publication Year	Brief Study Details	Characteristics	Prevalence	Awareness	Screening	Diagnosis	Treatment	Adherence	Control
The prevalence of chronic pain and its associated factors among Saudi Al-Kharj population; a cross sectional study: El-Metwally A; 2019	Cross-sectional study conducted in Al-Kharj, Saudi Arabia; data were collected on sociodemographic and health predictors, and anthropometric measurements	<i>n</i> = 1031; CLBP	✓	✗	✗	✗	✗	✗	✗
Prevalence of chronic pain and high-impact chronic pain in Saudi Arabia: Almalki MT; 2019	Cross-sectional online survey in the Arabic language from five regions of Saudi Arabia to evaluate chronic pain and high-impact chronic pain characteristics and prevalence in Saudi Arabia.	<i>n</i> = 26,372; CLBP	✓	✗	✗	✗	✗	✗	✗
Prevalence and risk factors of low back pain among Taif surgeons: Alzidani TH; 2018	A cross-sectional study among surgeons in Taif city randomly selected from three major hospitals in the city; data were collected on demographic, individual and occupational characteristics and prevalence	<i>n</i> = 141; CLBP	✓	✗	✗	✗	✗	✗	✗

Awareness of Osteoarthritis among Saudi population: Alharthi AS; 2017	A cross-sectional study in different Saudi Arabian regions to assess the awareness and knowledge of Osteoarthritis among Saudi population	n = 930; OA	✗	✓	✗	✗	✗	✗	✗	✗
Knowledge of knee osteoarthritis among general population in Aseer region: Mukharrib MS; 2018	A cross-sectional survey conducted in Aseer region; data were collected on awareness of knee OA	n = 1052; OA	✗	✓	✗	✗	✗	✗	✗	✗
Anecdotal Evidence [Dr. Sami Bahlas (Prof. of Rheumatology, King Abdel Aziz University)]	Anecdotal data	OA	✓	✓	✓	✓	✓	✓	✓	✓

CLBP, chronic low back pain; OA, osteoarthritis

### Data extraction and synthesis

Synthesis of the evidence and relevant extracted patient journey measures are summarized in

Table 2. Each chronic pain indication (rows) was tabulated on to different patient journey touchpoints (columns).

**Table-2: Patient Journey Touchpoint Estimates from the Included Studies**

Country	Population	Indications	Prevalence	Awareness	Screening	Diagnosis	Treatment	Adherence	Control
KSA	343,690,000	CLBP	8.4% * <sup>a</sup>					Data not available	
		OA	30% <sup>c</sup>	47.9% <sup>b</sup>	50% <sup>c</sup>	60% <sup>c</sup>	80% <sup>c</sup>	90% <sup>c</sup>	60% <sup>c</sup>

CLBP, chronic low back pain; KSA, Kingdom of Saudi Arabia; OA, osteoarthritis.

\*Studies including population subgroups, single-center studies or studies with samples size <500.

<sup>a</sup> Weighted average.

<sup>b</sup> Simple Average.

<sup>c</sup> Peer-reviewed publication.

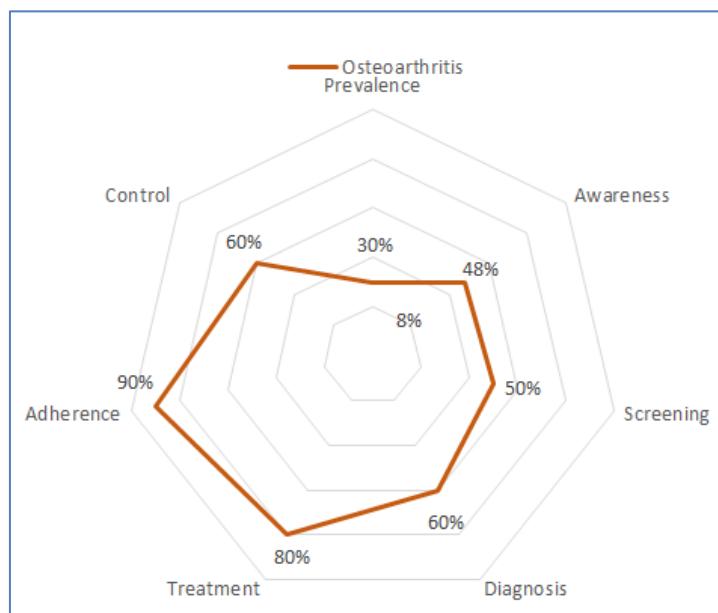
<sup>b</sup> Scientific Literature + Anecdotal data.

<sup>c</sup> Anecdotal data only.

### Mapping the evidence

The evidence mapping for the prevalence and quantitative distribution of patient journey touchpoints for CLBP and OA was visually depicted. The radar graph (Figure 2) shows evidence-based detailed quantitative information on prevalence for both indications and respective response pattern for each

patient journey touchpoint. The color of the leader lines differentiates each indication in terms of CLBP or OA in the map, and the overall coverage range represents the percentage distribution with respect to each patient journey touchpoint in the general population. Furthermore, no studies were available on CLBP patient journey touchpoints for mapping.



**Fig-2: Prevalence pattern and patient journey touchpoints**

The weighted mean prevalence of CLBP after pooling data from three independent cross-sectional studies was found to be 8.4% [12, 23, 33]. The published studies did not provide any quantitative evidence in terms of patient journey touchpoints for CLBP. The map further indicates the anecdotal evidence on OA for patient journey touchpoints in the population. As per anecdotal data, the prevalence of OA was estimated to be 30% among the general population of Saudi Arabia. The average mean estimates of OA awareness based on the data extracted from the published studies and the anecdotal evidence was found to be 47.9%. Further assessment of the anecdotal evidence showed that 50% of the patients were screened using standard pain assessment tools, and 60% had a diagnosis for OA. Most patients were taking pain medication (80%) and showed a higher degree of adherence to the prescribed medication (90%). Anecdotal evidence also highlights that 60% of patients showed improvement in pain symptoms.

## DISCUSSION

This is the first, semi-systematic, evidence-based study to quantitatively assess and identify gaps associated with the prevalence and different patient journey touchpoint in CLBP and OA setting in Saudi Arabia. Synthesis of the available evidence and identification of gaps in different patient journey touchpoints using a mapping tool has an advantage of presenting a wide range of information in an effective and user-friendly format to influence policymakers and health-care audiences [36].

### Evidence clusters and comparison with other studies

The prevalence of CLBP ranged from 4.3% to 20.3%, which indicates a disparity in reporting the prevalence of CLBP in the Saudi Arabian population [12, 23, 33]. The combined estimates of the prevalence from the shortlisted studies suggest that 8.4% of the general population suffers from CLBP. Studies reporting the prevalence of LBP in the general population are limited; nevertheless, comparisons between different subpopulations in a recent systematic review indicated higher prevalence of LBP, ranging from 63.8% to 89%, in Saudi Arabia [37]. This variation in the prevalence estimates might be attributed to the differences in methodologies, diagnostic practices, levels of disease severity, study settings, heterogeneous samples, time of onset and definition of chronic pain [38].

Although anecdotal data were not available for CLBP patient journey touchpoints, this approach supplemented data for different phases of management of OA including awareness, screening, diagnosis, treatment, adherence and control of symptoms. According to anecdotal data, the prevalence of OA among the Saudi Arabian general population was estimated to be 30%. A Dubai-based cross-sectional study reported similar findings, with a prevalence of

25.8% for knee OA [39]. Moreover, another community-based study from Saudi Arabia reported 24.5% prevalence of knee OA among the elderly population [40], thus providing substantial support to the estimation of prevalence of OA in the Saudi Arabian general population.

Several studies emphasized the importance of raising patient awareness for the detection and prevention of CLBP and OA symptoms [41-44]. Anecdotal data suggest lower rate of awareness (25%) for OA symptoms; however, the pooled estimates when combined with data from the cross-sectional studies indicated increased awareness rate (48%) in the Saudi Arabian population. This tendency of raised awareness might be due to different aspects of knowledge regarding OA. Additional recommendations to integrate pain education into medical training programs should be prioritized to increase public awareness and to achieve effective chronic pain management [45].

Early diagnosis and rigorous screening not only aid in the prevention of risk factors and symptoms but also allow for targeted treatment of LBP and chronic arthritis [41, 46-48]. Data supplemented from the anecdotal evidence revealed that 50% of the patients underwent screening and 60% had a diagnosis of OA. Enhanced access to diagnostic centers, primary care and specialized services will be helpful to alleviate the burden of chronic pain.

Per the anecdotal evidence, majority of the patients with OA (80%) received treatment. In addition, adherence to medication is rather very high (90%). However, the increase in treatment or medication adherence rates did not translate into symptom control, wherein only 60% of the patients showed improvement in OA symptoms. A recent cross-sectional survey reported that only 55% of patients were on medication for overall chronic pain in Saudi Arabia [12], which is markedly lower than the estimate specific to the OA treatment rate predicted in this study. Despite improved medication adherence, control of chronic pain symptoms may be a challenge. Medication adherence across treatment phases and impact of patient care pathways remain a complex phenomenon [49]. Therefore, a multifaceted and biopsychosocial approach such as encouraging patients, health-care providers and health-care systems to explore various adherence techniques toward treatment is essential for the effective management of the disease [26, 50].

### Implications for practice and policy recommendations

The outcome of this evidence map identified major gaps and revealed the presence of insufficient evidence pertaining to the concept of patient-centric health management for chronic pain indications, CLBP and OA in Saudi Arabia, making it difficult for policy and clinical decision-makers to guide evidence-

informed policies. The policy initiatives of Saudi Arabia should strive to improve the allocation and utilization of resources at both national and subpopulation levels by identifying research priorities and introducing health management strategies that focus on delivering better patient outcomes for chronic pain symptoms [51]. Delivering value-based health services should facilitate efforts to establish universal definitions of pain indications, standard pain assessment tools, and consistent pain measurement scales or uniform components of patient outcomes [51].

Improvement in the services and facilities of primary health-care has been recognized as the foundation for transforming health systems, and Saudi Arabia is already underway in creating a primary care-oriented system [52]. However, most primary centers have limited resources and lack medical know-how or training in pain medicine to offer best practices in patient care [21]. Recently, the US Department of Health and Human Services proposed “The Biopsychosocial Model of Pain Management” with the aim of creating a patient-centered approach to manage chronic pain indications [53]. Moreover, the recommendations made by the US Pain Management Best Practices Inter-Agency Task Force that emphasize the accessibility of educational tools for patients, health-care professionals and policymakers must be recognized by the Saudi Arabian Government to establish an equilibrium between best practices and patient needs [53]. Innovative approaches to deliver health services under the umbrella of “E-Health” initiatives, such as internet-delivered interventions, telemedicine, smartphone apps and telecare collaborative pain management, has been demonstrated to improve the status of health system functioning and decrease health resource utilization [21]. Pain education is another key component for developing pain assessment competencies and best practices among health-care professionals to engage greater benefits of appropriate screening, accurate diagnosis and patient-centered approach [54].

### Limitations

This semi-systematic review has a few limitations. Indexing a broad topic (both chronic pain and patient journey touchpoints) may have led to missing relevant studies. Moreover, studies conducted on specific patient subgroups were excluded, and therefore, we might have missed additional evidence. Nevertheless, such inclusions could have been an important addition to the evidence base but are unlikely to provide conclusive outcomes. In this review, the patient journey touchpoints were predefined subjectively and might be difficult to apply to this comprehensive search strategy. In addition, anecdotal data supplemented to address the data gaps are not peer-reviewed as they are not published evidence. Furthermore, the study is also limited by lack of quality assessment of the included studies. However, this semi-

systematic review has been designed to ensure maximum data coverage from the local context. It is also important to note that evidence maps can provide a broad overview of topic; however, no information on efficacy of any individual treatment intervention was provided for patients with chronic pain.

### CONCLUSION

A remarkably low number or lack of studies addressing patient management outcomes in CLBP and OA revealed a major gap in the investigation of awareness, screening, diagnostic testing, treatment, adherence and control of pain symptoms in Saudi Arabia. The absence of high-quality data in patient journey touchpoints for chronic pain indications indicate the need for more country-based research associated with these chronic indications.

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### REFERENCES

1. Fayaz, A., Croft, P., Langford, R. M., Donaldson, L. J., & Jones, G. T. (2016). Prevalence of chronic pain in the UK: A systematic review and meta-analysis of population studies. *BMJ Open*, 6(6). <https://doi.org/10.1136/bmjopen-2015-010364>
2. Treede, R. D., Rief, W., Barke, A., Aziz, Q., Bennett, M. I., Benoiliel, R., ... Wang, S. J. (2015). A classification of chronic pain for ICD-11. *Pain*, 156(6), 1003–1007. <https://doi.org/10.1097/j.pain.0000000000000160>
3. Gereau, R. W., Sluka, K. A., Maixner, W., Savage, S. R., Price, T. J., Murinson, B. B., ... Fillingim, R. B. (2014). A pain research agenda for the 21st century. *Journal of Pain*, 15(12), 1203–1214. <https://doi.org/10.1016/j.jpain.2014.09.004>
4. Koes, B. W., Tulder, M. W. Van., & Thomas, S. (2006). Diagnosis and treatment of low back pain. *BMJ*, 332, 1430–1434.
5. Haq, I., Murphy, E., & Dacre, J. (2003). Osteoarthritis. *Postgraduate Medical Journal*, 79, 377–383.
6. Alnaami, I., Awadalla, N. J., Alkhairy, M., Alburidy, S., Alqarni, A., Algarni, A., ... Mahfouz, A. A. (2019). Prevalence and factors associated with low back pain among health care workers in southwestern Saudi Arabia. *BMC Musculoskeletal Disorders*, 20(1), 56. <https://doi.org/10.1186/s12891-019-2431-5>
7. Beyera, G. K., O'Brien, J., & Campbell, S. (2019). Health-care utilisation for low back pain: a systematic review and meta-analysis of population-

- based observational studies. *Rheumatology International*, 39(10), 1663–1679. <https://doi.org/10.1007/s00296-019-04430-5>
8. Menon, J., & Mishra, P. (2018). Health care resource use, health care expenditures and absenteeism costs associated with osteoarthritis in US healthcare system. *Osteoarthritis and Cartilage*, 26(4), 480–484. <https://doi.org/10.1016/j.joca.2017.12.007>
  9. Froud, R., Patterson, S., Eldridge, S., Seale, C., Pincus, T., Rajendran, D., ... Underwood, M. (2014). A systematic review and meta-synthesis of the impact of low back pain on people's lives. *BMC Musculoskeletal Disorders*, 15(1), 50. <https://doi.org/10.1186/1471-2474-15-50>
  10. Neogi, T. (2013). The epidemiology and impact of pain in osteoarthritis. *Osteoarthritis and Cartilage*, 21(9), 1145–1153. <https://doi.org/10.1016/j.joca.2013.03.018>
  11. Vos, T., Lim, S. S., Abbafati, C., Abbas, K. M., Abbasi, M., Abbasifard, M., ... Murray, C. J. L. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, 396(10258), 1204–1222. [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9)
  12. Almalki, M. T., BinBaz, S. S., Alamri, S. S., Alghamdi, H. H., EL-Kabbani, A. O., Al Mulhem, A. A., ... Alswat, K. A. (2019). Prevalence of chronic pain and high-impact chronic pain in Saudi Arabia. *Saudi Medical Journal*, 40(12), 1256–1266. <https://doi.org/10.15537/smj.2019.12.24690>
  13. Alyami, A., Alswat, M., Omer, I., Ahmed, M., Alshammari, S., Alsaggaf, K., ... Aljafari, D. (2020). General population knowledge about osteoarthritis and its related risk factors in Jeddah Saudi Arabia. *Saudi Medical Journal*, 41(5), 516–523. <https://doi.org/10.15537/smj.2020.5.25061>
  14. Moslem, W. M., Alrwaily, M., & Almarwani, M. M. (2020). Adherence to low back pain clinical practice guidelines by Saudi physical therapists: a cross-sectional study. *Physiotherapy Theory and Practice*, 00(00), 1–14. <https://doi.org/10.1080/09593985.2020.1806420>
  15. Mills, S., Torrance, N., & Smith, B. H. (2016). Identification and Management of Chronic Pain in Primary Care: a Review. *Current Psychiatry Reports*, 18(2), 22. <https://doi.org/10.1007/s11920-015-0659-9>
  16. Hill, J. C., Whitehurst, D. G. T., Lewis, M., Bryan, S., Dunn, K. M., Foster, N. E., ... Hay, E. M. (2011). Comparison of stratified primary care management for low back pain with current best practice (STarT Back): a randomised controlled trial. *The Lancet*, 378(9802), 1560–1571. [https://doi.org/10.1016/S0140-6736\(11\)60937-9](https://doi.org/10.1016/S0140-6736(11)60937-9)
  17. Jinks, C., Jordan, K., & Croft, P. (2002). Measuring the population impact of knee pain and disability with the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). *Pain*, 100(1), 55–64. [https://doi.org/10.1016/S0304-3959\(02\)00239-7](https://doi.org/10.1016/S0304-3959(02)00239-7)
  18. Lim, Y. Z., Chou, L., Au, R. T., Seneviwickrama, K. M. D., Cicuttini, F. M., Briggs, A. M., ... Wluka, A. E. (2019). People with low back pain want clear, consistent and personalised information on prognosis, treatment options and self-management strategies: a systematic review. *Journal of Physiotherapy*, 65(3), 124–135. <https://doi.org/10.1016/j.jphys.2019.05.010>
  19. WHO Framework on integrated people-centred health services. (n.d.).
  20. Wolfe, A. (2001). Institute of Medicine Report: Crossing the Quality Chasm: A New Health Care System for the 21st Century. *Policy, Politics, & Nursing Practice*, 2(3), 233–235.
  21. Cheatle, M. D. (2016). Biopsychosocial Approach to Assessing and Managing Patients with Chronic Pain. *Medical Clinics of North America*, 100(1), 43–53. <https://doi.org/10.1016/j.mcna.2015.08.007>
  22. Alkandari, M., Ryan, K., & Hollywood, A. (2019). The Experiences of People Living with Peripheral Neuropathy in Kuwait—A Process Map of the Patient Journey. *Pharmacy*, 7(3), 127. <https://doi.org/10.3390/pharmacy7030127>
  23. Alzidani, T., Alturkistani, A., Alzahrani, B., Aljuhani, A., & Alzahrani, K. (2018). Prevalence and risk factors of low back pain among Taif surgeons. *Saudi Journal for Health Sciences*, 7(3), 172. [https://doi.org/10.4103/sjhs.sjhs\\_70\\_18](https://doi.org/10.4103/sjhs.sjhs_70_18)
  24. Alharthi, H. (2018). Healthcare predictive analytics: An overview with a focus on Saudi Arabia. *Journal of Infection and Public Health*, 11(6), 749–756. <https://doi.org/10.1016/j.jiph.2018.02.005>
  25. Birnie, K. A., Ouellette, C., Do Amaral, T., & Stinson, J. N. (2020). Mapping the evidence and gaps of interventions for pediatric chronic pain to inform policy, research, and practice: A systematic review and quality assessment of systematic reviews. *Canadian Journal of Pain*, 4(1), 129–148. <https://doi.org/10.1080/24740527.2020.1757384>
  26. Hylands-White, N., Duarte, R. V., & Raphael, J. H. (2017). An overview of treatment approaches for chronic pain management. *Rheumatology International*, 37(1), 29–42. <https://doi.org/10.1007/s00296-016-3481-8>
  27. Lovering, S. (2006). Cultural Attitudes and Beliefs About Pain. *Journal of Transcultural Nursing*, 17(4), 389–395. <https://doi.org/10.1177/1043659606291546>
  28. Ganann, R., Ciliska, D., & Thomas, H. (2010). Expediting systematic reviews: methods and implications of rapid reviews. *Implementation Science*, 5(1), 56. <https://doi.org/10.1186/1748-5908-5-56>
  29. Miake-Lye, I. M., Mak, S., Lee, J., Luger, T., Taylor, S. L., Shanman, R., ... Shekelle, P. G. (2019). Massage for Pain: An Evidence Map. *The*

- Journal of Alternative and Complementary Medicine*, 25(5), 475–502.  
<https://doi.org/10.1089/acm.2018.0282>
30. Devi, R., Kanitkar, K., Narendhar, R., Sehmi, K., & Subramaniam, K. (2020). A Narrative Review of the Patient Journey Through the Lens of Non-communicable Diseases in Low- and Middle-Income Countries. *Advances in Therapy*. <https://doi.org/10.1007/s12325-020-01519-3>
  31. Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., ... Moher, D. (2009). The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and Elaboration. *PLoS Medicine*, 6(7), e1000100. <https://doi.org/10.1371/journal.pmed.1000100>
  32. Bharatan, T., Devi, R., Huang, P. H., Javed, A., Jeffers, B., Lansberg, P., Sidhu, K., Subramaniam, K. A. In Press (2021). Methodology for Mapping the Patient Journey for Noncommunicable Diseases in Low- and Middle-Income Countries. *Journal of Healthcare Leadership*.
  33. El-Metwally, A., Shaikh, Q., Aldiab, A., Al-Zahrani, J., Al-Ghamdi, S., Alrasheed, A. A., ... Aldossari, K. K. (2019). The prevalence of chronic pain and its associated factors among Saudi Al-Kharj population; a cross sectional study. *BMC Musculoskeletal Disorders*, 20(1), 177. <https://doi.org/10.1186/s12891-019-2555-7>
  34. Alharthi, A. S. (2017). Awareness of Osteoarthritis among Saudi population. *International Journal of Scientific & Engineering Research*, 8(12), 1688–1692.
  35. Mukharrib, M., Al-Sharif, M., Alshehri, T., & Shaker, A. (2018). Knowledge of knee osteoarthritis among general population in Aseer region. *Journal of Family Medicine and Primary Care*, 7(6), 1385. [https://doi.org/10.4103/jfmpc.jfmpc\\_290\\_18](https://doi.org/10.4103/jfmpc.jfmpc_290_18)
  36. Miake-Lye, I. M., Hempel, S., Shanman, R., & Shekelle, P. G. (2016). What is an evidence map? A systematic review of published evidence maps and their definitions, methods, and products. *Systematic Reviews*, 5(1), 28. <https://doi.org/10.1186/s13643-016-0204-x>
  37. Aldera, M. A., Alexander, C. M., & McGregor, A. H. (2020). Prevalence and Incidence of Low Back Pain in the Kingdom of Saudi Arabia: A Systematic Review. *Journal of Epidemiology and Global Health*, i. <https://doi.org/10.2991/jegh.k.200417.001>
  38. Wong, W. S., & Fielding, R. (2011). Prevalence and Characteristics of Chronic Pain in the General Population of Hong Kong. *The Journal of Pain*, 12(2), 236–245. <https://doi.org/10.1016/j.jpain.2010.07.004>
  39. Al Saleh, J., El Sayed, M., Monsef, N., & Darwish, E. (2016). The prevalence and the determinants of musculoskeletal diseases in Emiratis attending primary health care clinics in Dubai. *Oman Medical Journal*, 31(2), 117–123. <https://doi.org/10.5001/omj.2016.23>
  40. Alkuwaity, K. W., Mohammad, T. N., Hussain, M. A., Alkhanani, A. J., Mohamed, A., & Ali, B. (2018). Prevalence and Determinant Factors of Osteoarthritis of the Knee Joint among Elderly in Arar, KSA. *The Egyptian Journal of Hospital Medicine*, 72(9), 5173.
  41. Saeed, F., Humayun, A., Fatima, S. M., Junaid, V., Imtiaz, H., Zehra, M., ... Fatima, K. (2019). The Pressing Need to Raise Awareness about Osteoarthritis Care among Elderly Females in Pakistan: A Cross-sectional Study. *Cureus*, 11(8), 1–9. <https://doi.org/10.7759/cureus.5302>
  42. Wand, B. M., Catley, M. J., Rabey, M. I., O'Sullivan, P. B., O'Connell, N. E., & Smith, A. J. (2016). Disrupted Self-Perception in People With Chronic Low Back Pain. Further Evaluation of the Fremantle Back Awareness Questionnaire. *The Journal of Pain*, 17(9), 1001–1012. <https://doi.org/10.1016/j.jpain.2016.06.003>
  43. Maciel, S. C., Jennings, F., Jones, A., & Natour, J. (2009). The development and validation of a low back pain knowledge questionnaire - LKQ. *Clinics*, 64(12), 1167–1175. <https://doi.org/10.1590/S1807-59322009001200006>
  44. Tavafian, S. S., Eftekhar, H., Mohammad, K., Jamshidi, A. R., Assasi, N., Shojaeezadeh, D., & Ghofranipour, F. (2004). Patient's knowledge, perception and belief about the reasons of low back pain. *Iranian Journal of Public Health*, 33(4), 57–60.
  45. Kress, H.-G., Aldington, D., Alon, E., Coaccioli, S., Collett, B., Coluzzi, F., ... Sichère, P. (2015). A holistic approach to chronic pain management that involves all stakeholders: change is needed. *Current Medical Research and Opinion*, 31(9), 1743–1754. <https://doi.org/10.1185/03007995.2015.1072088>
  46. Mehling, W. E., Avins, A. , Acree, M. , Carey, T. , & Hecht, F. M. (2015). Can a back pain screening tool help classify patients with acute pain into risk levels for chronic pain? *European Journal of Pain*, 19(3), 439–446. <https://doi.org/10.1002/ejp.615>
  47. Chu, C. R., Williams, A. A., Coyle, C. H., & Bowers, M. E. (2012). Early diagnosis to enable early treatment of pre-osteoarthritis. *Arthritis Research & Therapy*, 14(3), 212. <https://doi.org/10.1186/ar3845>
  48. O'Sullivan, P. (2005). Diagnosis and classification of chronic low back pain disorders: Maladaptive movement and motor control impairments as underlying mechanism. *Manual Therapy*, 10(4), 242–255. <https://doi.org/10.1016/j.math.2005.07.001>
  49. Harrison, E. (2018). The Cost of Not Taking Our Medicine: The Complex Causes and Effects of Low Medication Adherence. *The American Journal*

- of Accountable Care, 12(4), 11–13.*
50. Jimmy, B., & Jose, J. (2011). Patient Medication Adherence: Measures in Daily Practice. *Oman Medical Journal, 26(3), 155–159.* <https://doi.org/10.5001/omj.2011.38>
51. KSA Vision 2030, Health Sector Transformation Strategy. (n.d.). Ministry of Health. [https://doi.org/10.1007/978-3-540-71868-0\\_17](https://doi.org/10.1007/978-3-540-71868-0_17)
52. Roodenburg, E., & Pall, N. (2019). The paradox of primary care. KPMG International.
53. Pain Management Best Practices Inter-Agency Task Force Report: Updates, Gaps, Inconsistencies, and Recommendations (2019).
54. Fishman, S. M., Young, H. M., Lucas Arwood, E., Chou, R., Herr, K., Murinson, B. B., ... Strassels, S. A. (2013). Core Competencies for Pain Management: Results of an Interprofessional Consensus Summit. *Pain Medicine, 14(7), 971–981.* <https://doi.org/10.1111/pme.12107>

**Supplementary Table-1: Search Strategy for Structured Search**

Database Searched	Keywords	Limits Applied	Exclusion Criteria for Screening
MEDLINE, Embase, BIOSIS	exp low back pain/ OR exp chronic pain/ OR exp fibromyalgia/ OR exp rheumatoid arthritis/ OR exp osteoarthritis/ OR exp Arthritis/ OR exp headache/ OR exp Migraine/ OR exp musculoskeletal pain/ OR "Chronic pain" or Fibromyalgia or "low-back pain" or rheumatoid or osteoarthritis* or "Arthritic pain" or "Arthritis pain" or headache or Migraine or "musculoskeletal pain" AND Incidence or Prevalence or Occurrence or burden or Epidemiolog* or Screen* or Treat* or Management or Therap* or Aware* or Unaware* or Knowledge or Diagnos* or Undiagnos* or Adheren* or Complain* or nonadheren* or non-adheren* or Control* or uncontrol* or Untreat* AND KSA or Saudi Arabia* or Saudi* or Arab*	1. Time period: 01 January 2010 till date of search (11 December 2019) 2. Language: English 3. Species: Humans, Human 4. Full text available	1. Not focusing on chronic pain 2. Population not nationally representative 3. Relevant patient journey data not available 4. Not as per inclusion criteria

**Supplementary Table-2: Definition of Patient Journey Touchpoints**

Touchpoints	Definition
Awareness	Self-reported knowledge or awareness of chronic pain condition
Screening	Proportion of patients screened using standard pain assessment tools
Diagnosis	Patients diagnosed with CLBP and/or OA
Treatment	Patients taking pharmacological pain medication
Adherence	Proportion of respondents indicating adherence and/or compliance to the prescribed pharmacological pain medication
Control	Patients reporting an improvement in pain symptoms, quality of life or disease symptoms (self-reported or using an assessment tool)

CLBP, chronic low back pain; OA, osteoarthritis.