Process and Feasibility of IMPLEMENTING GUIDELINE recommendations for the care of Osteoarthritis in West-Africa

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**Abstract**

**Objectives:** To assess the feasibility of a guideline-informed model of care for osteoarthritis in primary healthcare and community pharmacy settings in West-African context.

**Methods:** 4-phase mixed-methods programme of research undertaken in south-west Nigeria, West-Africa. Phases 1-2 involved contextual adaptation of guideline-informed care - **J**oint **I**mplementation of **G**uidelines for O**S**teo**A**rthritis in **W**est-**Africa** (JIGSAW-A):

* focus groups (n=4) with patients, community pharmacists and healthcare professionals (HCPs) to identify patient preferences and support needs of HCPs;
* Stakeholders resource contextualisation/co-design (i.e. Osteoarthrtitis guidebook in local languages, HCPs training/support package). Iterative co-design workshops (n=3) using participatory approaches, model OA consultation simulations and consensus agreement.

Phase 3: Following training, and a 12-week pilot implementation period, patient-reported quality of care was assessed by the OsteoArthritis Quality Indicator questionnaire (modified 9-item, scale 0–100%, 100%=best) and implementation of the JIGSAW-A model of care was evaluated using the RE-AIM framework. Patient and HCP interviews explored barriers and facilitators, usefulness and acceptability. In phase 4, recommendations for further scale-up and wider implementation of integrated osteoarthritis care were specified.

**Results:** Phases 1-2highlight the burden and impact of everyday living with joint pain; and misinformation which affects help seeking. Participants expressed the need for a broad information and education campaign, and access to self-management support which informed iterative contextualisation of osteoarthritis care and patient information resources used to support pilot implementation in phase 3.

Over 12-weeks, twelve HCPs (community pharmacies, physiotherapists, and doctors) were involved in evaluation across nine sites. Of 369 patient consultations that were reported, high rates of quality indicator achievement were found for self-management advice (97%), topical analgesic use (89%), and exercise recommendations (87%). Compliance with full patient assessment in line with the protocol was poor (17%).

**Conclusions:** We found that evidence-based care for osteoarthritis, involving community pharmacies (as a usual first point of call) and other primary care clinicians is feasible and may improve aspects of care in low-resource settings. Further research is needed to ascertain long-term sustainability and cost-effectiveness.

**Keywords: Osteoarthritis, Primary care, Community Pharmacies, Healthcare Professionals, Nigeria, West-Africa.**

**What is already known on this topic**

* Africa contributes up to 21% to the increasing prevalence of osteoarthritis globally.
* There are evidence-based resources that can potentially support care and patient self-management in real world settings, but these are underpinned by research largely from North America and Europe and have yet to be contextualised for use in West-Africa and other low-resource settings.

**What this study adds**

* Evidence-based care for osteoarthritis, is feasible and can improve quality of care in low-resource settings
* Being a usual first point of call for many patients seeking symptoms relief, community pharmacies have a critical role in osteoarthritis management through brief education/advice and signpost to other appropriate treatments (e.g., physiotherapy-led exercises)
* People living with osteoarthritis in low-resource health settings (e.g., Nigeria, West-Africa) increasingly value evidence-based health information and advice for managing their conditions.

**How this study might affect research, practice or policy**

* There is need to establish further the clinical and cost-effectiveness of guideline-informed care for osteoarthritis across low-resource settings
* With increasing prevalence of osteoarthritis and potential effect on productivity, long-term health system infrastructures to support people to self-manage will likely yield good return on health and socio-economic investment particularly in Africa, where a large proportion of people living with osteoarthritis are women, and are of working age.

**Introduction**

Africa contributes significantly to the increasing global prevalence (>21%), unmet needs and treatment burden for osteoarthritis1-3. Characterised by pain, disability, and impaired quality of life, Osteoarthritis is a serious joint disease with direct and indirect costs of treatment and work-related losses leading to considerable economic burden and widening health and social inequity1,4-5. Significant investments have led to development of high-quality clinical guidelines6 and evidence-based resources7 that can potentially support care and patient self-management in primary care and community settings, yet implementation of these recommendations in practice continues to lag in real world settings8. Furthermore, current clinical guidelines and evidence-based resources are largely underpinned by research from North America and Europe and have yet to be contextualised for use in West-Africa and other low-resource settings.

Due to “cultural conventions/misconceptions” about their conditions, out-of-pocket healthcare expenses, and ease of access; people living with osteoarthritis in Nigeria and most West-African countries commonly self-medicate or seek help from community drug retail outlets and pharmacies to relieve pain before and alongside seeking formal advice in clinics and hospitals9,10. Despite the high osteoarthritis prevalence and symptom burden, and known use of community pharmacies by those living with chronic pain1-3,10, no research has examined the role of community-pharmacists and their support needs for managing osteoarthritis in West-Africa.

While there is currently no known cure for osteoarthritis, structured management programmes/care packages which include core treatments such as patient education, exercise, and weight management have been recommended with the goal of reducing symptoms and improving function11. To our knowledge, there is no report yet of a structured osteoarthritis management care programme with core guideline recommendations, contextualised and implemented in West-African settings. Based on previously successful osteoarthritis research and implementation programmes in Europe i.e., the **J**oint **I**mplementation of **G**uidelines for O**S**teo**A**rthritis in **W**est- **E**urope (JIGSAW-E, <https://jigsaw-e.com/>), this study (JIGSAW-Africa) was a pilot implementation project conducted in Nigeria as a starting point to addressing research and practice gaps in improving quality care for osteoarthritis in West-Africa. The overarching aim of JIGSAW-A was to improve the availability of evidence-based care for people with osteoarthritis, by empowering patients with high-quality, accessible information, and supporting pharmacists and other Healthcare professionals (HCPs) to deliver osteoarthritis care within an integrated primary healthcare system, in line with core guideline recommendations. Across four iterative study phases, specific objectives were to:

1. understand local context specific patient information needs, community-based pharmacies support needs to deliver an evidence-based care by exploring patient, and HCPs’ views and experiences regarding osteoarthritis care in Nigeria.
2. culturally adapt, contextualise and refine a previously developed (i.e. existing JIGSAW-E tools) osteoarthritis patient guidebook to aid patient education and advice as well as HCPs care support package.
3. evaluate the acceptability, useability, and impact of the JIGSAW-A approach on osteoarthritis care among patients and HCPs using JIGSAW-A resources in Nigeria.
4. develop knowledge mobilisation strategies/recommendations for the wider implementation of conceptualised JIGSAW-A resources and evidence-based care for osteoarthritis in West-Africa.

This paper focuses on the process, feasibility evaluations of JIGSAW-A pilot in Nigeria and recommendations for wider implementation (objectives 3 & 4). Specifically, we sought to: understand HCPs and patients’ perspectives of the perceived effect of the care they delivered (or received) as informed by JIGSAW-A; explore whether the results are likely to be generalisable, scalable, and sustainable by exploring stakeholders’ experiences of the JIGSAW-A model of care and its perceived impact.

**Methods**

**Study design and conceptual framework**

JIGSAW-A is a mixed methods pilot implementation project (Fig.1) aimed at improving the quality, and value of care in primary care and community settings and is reported based on the SQUIRE reporting guidelines12. The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Ethical approval was sought and obtained from the Research Ethics Committee of University of Ibadan, Nigeria (reference: UI/SSHEC/2022/0023) and Keele University (KU0420).

This project aligns with the development and feasibility stages of the Medical Research Council’s guide for developing and evaluating complex interventions13. It was informed by the Theoretical Domains Framework (TDF)14 and the Reach-Effectiveness-Adoption-Implementation-Maintenance (RE-AIM) framework15 was used to evaluate implementation outcomes. The RE-AIM was used to enhance understanding of how best to implement context specific integrated care for osteoarthritis, involving community pharmacies, and other HCPs.

**Figure 1. Overview of JIGSAW-A project**

Detailed methods, and findings from phases 1 and 2 have been reported elsewhere16,17 and are briefly summarised below:

**Phase 1**: five focus group discussions were held. Three included people living with osteoarthritis (n = 30, age range 45–90 years) 16 who described their experiences of living with osteoarthritis as emotionally, physically and socio-economically challenging. Participants expressed the need for a broad information and joint health education campaign and access to appropriate health professionals (especially physiotherapists) for providing support, guidance and assistance with self-management.

The two focus group discussions were conducted with 22 HCPs (including community-based pharmacy teams, physiotherapists, nurses and doctors), with 5–39 years of practice (mean = 21.5). Discussions confirmed community pharmacies and drug retail outlets as the usual first point of call for most patients and participants expressed the need for professional education and context-sensitive national guidelines, co-developed and agreed to inform the care of patients with Osteoarthritis and joint pain. Summary of findings from fact finding in phase 1 which informed contextualisation and pilot implementation of JIGSAW-A is presented in Fig. 2.

Figure 2: JIGSAW-A Phase 1 Summary of Findings.

**Phase 2**: Stakeholder contextualisation, and co-design of JIGSAW-A resources followed an iterative design involving three stakeholder co-design workshops which included osteoarthritis consultation simulations and were complemented with ongoing feedback throughout. Stakeholders (n=45), who were recruited through known networks and broad advertisements, included patients/carers, pharmacists and pharmacy technicians, physiotherapists, doctors, nurses, rheumatologists, orthopaedic surgeons, representatives of professional bodies (e.g., Nigerian Society of Physiotherapists, Nigerian Association of Community Pharmacies), local voluntary sector organisations, osteoarthritis researchers, implementation and communication experts. They formed a community of practice (CoP) which contributed to the JIGSAW-A tool contextualisation phase and strategic recommendations in phase 4 (see below). The resulting JIGSAW-A resources used in pilot implementation consisted of:

1. contextualised training programme for HCPs,
2. patient information resources (short and long version of Osteoarthritis guidebooks in local languages),
3. Quality care indicator templates in local languages to assess care given,
4. JIGSAW-A consultation log to support assessment and management and
5. model care map and algorithm.

**Phase 3:** **Feasibility study of JIGSAW-A**

**JIGSAW-A model of care**

The JIGSAW-A care was conceptualised by the research team together with stakeholders as structured care for patients with Osteoarthritis, many of whom start their journey of care in community pharmacies. Supported by an algorithm (irrespective of starting points, see appendix 1), HCPs were instructed to de-prioritise the need for x-ray investigations where clinical diagnosis confirms osteoarthritis and give education and information on osteoarthritis as a long-term condition (LTC). They were also instructed to use guideline-recommended treatment approaches, provide pharmacological treatment/de-prescribe when appropriate, advise on exercise and suggest referral to physiotherapy where feasible.

**Training of Health Professionals**

A core strategy for Implementation of JIGSAW-A model of care was the training of multidisciplinary HCPs. Participating sites and associated HCPs were recruited from participants in phase 1, existing networks of the study team and advertisement via a professional association. Consenting sites were selected to represent professional role/context of work (community pharmacies - 70%), size and location of practice. HCPS attended a 3-hour JIGSAW-A interactive workshops and online training informed by current evidence and guideline recommendations for managing osteoarthritis (six-modules using participatory approaches including vignettes to encourage interactions among participants and deepen engagement with learning). An outline of the training is presented in appendix 1. A second 1 hour “booster” training session (4-5 weeks later, 11 HCPs working across participating sites) was conducted to confirm use of the JIGSAW-A guideline-informed model of care, reinforce learning, address early implementation challenges and clarify the evaluation process.

**Management protocol and feasibility evaluations in participating sites**

Post-training, JIGSAW-A resources and study packs (containing a participant interview invitation letter, and a JIGSAW-A study information sheet) was distributed to consenting sites (community pharmacists and physiotherapists). Training certificates, and slide presentations together with supplementary explanatory notes were provided to the trained professionals for reference (as needed). Fortnightly site visits/telephone calls were then conducted to offer technical support as needed to participating sites.

The management protocol included patient assessment, education and advice on self-management using the JIGSAW-A guidebook, pain medicines review or and/or referral where necessary using the care map/algorithm. Additionally, an indicative exercise therapy protocol which could be used was outlined. Trained community pharmacists (n=7), a family physician (1) and physiotherapists (2), completed the training (including the booster sessions) and delivered the intervention. Key targets were to empower patients with understandable evidence-based information, thereby enhance self-management; reduce use of unnecessary imaging for diagnosis and assessment and de-emphasise routine use of pain medicines in the hope of relieving their joint pain.

The feasibility of guideline-informed JIGSAW-A care for people living with osteoarthritis was then assessed in community pharmacies and health centres in Southwest Nigeria (Oyo and Lagos State). Evaluation involved analysis of consultation logs and review of quality-of-care indicator questionnaires from each site. Using topic guides, developed by the research team based on previous literature and with input from public contributors, semi-structured interviews were held with HCPs who delivered the intervention and consenting patients (approximately 2 per site). Patient participant recruitment was pragmatic via the HCPs to involve approximately 2 patients (per site) who consulted for osteoarthritis/ joint pain during the 3 months of pilot implementation leading up to the evaluation. To be eligible, willing participants had to be adults aged 45 years old or over with joint pain likely to be attributable to osteoarthritis, Vulnerable individuals (e.g., people in a palliative phase of care, or people with unstable mental health), and those unable to provide informed consent were excluded.

The interviews were used to gain more detailed information about the usability, accessibility, and usefulness of JIGSAW-A resources. The interviews explored participants’ experiences of care (patients) or management of patients with osteoarthritis (health professionals), including priorities for delivering care for osteoarthritis as an LTC, and perceived barriers and facilitators related to the use of the JIGSAW-A tool for delivering care. Open questions at the end of the interviews allowed participants to discuss anything else they considered to be relevant and important, and further exploration of any unanticipated issues raised by participants during the interview. The interviews lasted no more than 1 hour and were held face-to-face in line with established ethical principles and audio recorded. Verbatim transcriptions of interviews were checked for accuracy against the audio recording and fully anonymised. All participants provided written and verbal informed consent.

**Analysis**

Descriptive analysis of consultation logs data was used to capture indicative practice per participating site over the 3-month period. The patient-reported quality of osteoarthritis care as assessed with the Osteoarthritis Quality Indicator questionnaire reflects core guideline recommendations. Patient participants were instructed to consider the treatment, information, or advice they had received from the HCP (at respective site) within the 3-month period. Items in the questionnaire had ‘Yes’/’No’, and ‘Not applicable’/‘Don’t remember’ as the response options. Each quality indicator item was considered achieved if the patient had checked ‘Yes’ for that item. Achievement of the quality indicator item was calculated as the total number of indicator items achieved divided by the number of eligible items for each patient (in percentage).

A thematic analysis of interview transcripts was performed to identify relevant themes broadly within the structures and domains of the RE-AIM framework. Coding and analyses were performed using Nvivo (NVivo qualitative software (version 12). To minimise the risk of researcher bias, five out of twenty-two interviews were randomly selected and independently coded and discussed by two researchers (OB, TO) and following consensus, coding was continued by one researcher (TO). Descriptive analysis was followed by an interpretive analysis, through several cycles. After multiple readings, descriptive codes and categories were generated from the transcript data. These were clustered and re-clustered to inductively identify themes and sub-themes which were then mapped to the RE-AIM framework (by the core study team members OB, OA, IA). The themes, feedback and notes from site visits were examined, presented to the wider study team and public contributor for interpretation of findings, focussing on what did and did not work, lessons learned and areas for refinement.

**Public Involvement and Engagement**

The project recruited five people to receive training and provide patient and public involvement and engagement (PPIE) perspectives to the research by sustained contributions to key aspects including the design, conduct, interpretation and dissemination of findings. Meetings were held bi-monthly throughout the research process. Public contributors attended and made contributions to discussions in study steering group meetings (x 3). As needed (total=4 times), public contributors also attended research team meetings to provide advice on recruitment strategies, contextualised resources and implementation activities. Specifically, two male public contributors (aged ≥65 years with lived experience of osteoarthritis of hip and knee, > 5 years) were involved in site monitoring visits with researchers, broaching conversations with practitioners about the importance of JIGSAW-A study and personal testimonies of the impact of JIGSAW-A guidebook on own approach to self-management (see quote below, shared with permission).

*“It was a busy time, and they were being selective in the kind of patient they gave the guidebook to. I know they can’t give anybody anyway as there is not enough to go round. But after I spoke to him as a patient representative, while I was there, he had to bring out the file and began to fill in the consultation log. He said, I'm going to administer the questionnaire also on other persons. I understand the impact better now …I believe in your experiences”*

Public contributors also gave talks at community engagement events (road shows) which helped to raise awareness and share information about osteoarthritis and the JIGSAW-A model of care.

**Results**

Of fifteen sites who initially expressed interest in taking part in the feasibility study, eight community pharmacies and two health centres with at least one JIGSAW-A trained CP/HCP provided consent to participate and were enrolled. One community pharmacy later dropped out citing high-workload, insufficient time commitment to deliver care in line with JIGSAW-A, and lack of incentives. In total, nineteen semi-structured interviews were completed (8 HCPs - 1 Community Nurse, 1 Physiotherapist, 6 Community pharmacists and 11 patients with osteoarthritis) across the nine participating sites (Table 1). A description of themes mapped to domains of the RE-AIM framework is provided below and summarised in supplementary table 1.

***Reach***

Over the course of 3 months roll using JIGSAW-A resources, sites reported an average caseload of ten (range 4-13) osteoarthritis patients per day. In total 976 patients were reportedly provided with JIGSAW-A patient guidebooks across sites over the course of 3 months. Review and analysis of practice logs and across participating sites showed 369 patients were provided consultation in line with JIGSAW-A model of care (Fig.3, Table 1).

**Figure 3. JIGSAW-A pilot sites management options offered across each facility over 3 months**.

*HCPs* who were interviewed all highlighted that JIGSAW-A training enhanced their knowledge of current evidence on osteoarthritis and guideline recommendations. They reported being open to aligning their practice to evidence-informed care for Osteoarthritis:

*“At least I got a different perspective asides just prescribing medications. An emphasis on exercise, diet and all these support resources has been helpful and I'm sure it will be helpful to other professionals too.” HCP8*

“*I would say yes it impacted our practice because it now made me know that there's actually more I can do in joint management, there's so much more than giving pain killers”. HCP1*

However, some HCPs were selective in giving out the JIGSAW-A guidebooks:

*“It’s not many and we're not able to give it out to all.. They could finish within a week!” HCP 4.*

“*let me be honest with you.. because I saw that it took a lot of money to print those things. So it won't be fair if I give it to some person who will just abandon it*. *….Africans don't read, they like pictures and funny videos that would illustrate what to do. They don't like lengthy things. So if it can be, make it into a fancy card or probably an interactive version so that everyone would be able to use*” HCP 9

**Experience of the effectiveness of the JIGSAW-A model of care**

The JIGSAW-A model of care seemed to be perceived to be largely beneficial. HCPs explained that JIGSAW-A resources expanded their knowledge on current evidence, increased their awareness on the critical role of information giving, and best practice for the management of osteoarthritis.

*“I am more conscious of the fact that we, you don't need X-ray to diagnose osteoarthritis” HCP1*

*“To reassure all my patients about their pain and then it helps to reduce their worry, it helps to reduce their anxiety and they focus on the exercises I show them to do” HCP6*

Given the short term between implementation and evaluation, not all patients reported relief of symptoms but many expressed being empowered with information and the need to reduce over dependence on pain medicines.

*“There is nothing compared to a person doing exercise, because I observed changes whenever I do the physio exercise. I didn't buy any drug nor did I go to their place [*referring to prior physician-practice not connected to JIGSAW-A*] ever since then because they confirmed that it is only operation I can do and the chances of the operation is 50/50” P9*

*“They gave me chance to express myself. I was informed on how to take good care of myself and I’m practicing physical exercises daily. The instructions given in the guidebook are useful. The joint is not paining me as much again and I am satisfied with the explanation given me. I pray for them” P2*

***Adoption***

In relation to actual adoption, trained HCPs across sites adopted the JIGSAW-A model of care in their practice. However, they felt effective adoption requires system-wide training, shared understanding and cooperation among inter-professional networks. They explained that JIGSAW-A resources should be primarily adopted by the health boards and professional organisations such that managing patients using the JIGSAW-A model of care would not be an individual HCP style but a health system-wide approach where multidisciplinary professions involved in osteoarthritis care (e.g. Physicians, Physiotherapists, nurses, orthopaedic surgeons) uses the JIGSAW-A consistently as appropriate for each patient.

*“So I would say that here, if JIGSAW-A can bring all of us together, why not? For myself I would say that yes, it opened my eyes so that I can actually work better with physiotherapists” HCP6.*

The JIGSAW-A resources also received recommendation and endorsements from two professional associations (community pharmacies and physiotherapy).

In relation to the adoption process*,* many of the trained HCPs alluded to sharing information and resources from JIGSAW-A training with members of their team. Though the extent to which the training was cascaded down and adopted by other practitioners was untested and is therefore unknown. Furthermore, HCPs identified several factors that impacted on the adoption of the JIGSAW-A model of care. In particular, they reported being short of time due to high patient caseload. In addition, the shift in priorities (e.g. away from purely pharmacological management of pain and there being less emphasis on use of imaging in assessment and diagnosis) in the JIGSAW-A approach introduced uncertainties/incompatibility with current workflows for most HCPs and also raised concerns about income generation for community pharmacies.

*“sincerely I have not had time to follow through with them and the reason is very simple. We have four branches like this, so I also have other things that I am doing and they are kind of overwhelming”. HCP9*

Furthermore, to adopt self-management including the use of the of the JIGSAW-A guidebooks, many patients required additional help: “*My children help me read the book to my hearing” P2*

***Implementation fidelity***

Figure 3 presents trends in use of the JIGSAW-A approach to management of osteoarthritis per site over the course of 3 months implementation period. There was variation in implementation across sites with high rates of quality indicator achievement found for advice on self-management (97%), use of topical analgesics (89%) and recommendations for exercise (87%). Only sites with physiotherapists (n=2) undertook full patient assessment in line with the protocol. Community pharmacies routinely supplied and/or prescribed topical gels which may have been an indirect compensation for the shift from de-prescription of routine pain medicines that was emphasised during training.

Most HCPs provided the quality indicator questionnaire to patients after consultations but stated that this method resulted in patients taking questionnaires home without returning them. In other instances, feedback on care received was requested/provided verbally without the use of the quality-of-care indicator questionnaire, which may have resulted in some patients providing socially desirable answers.

Some community pharmacists explained that the JIGSAW-A resources could not be used as per protocol for all potentially eligible patients given the time and resources involved in providing detailed consultations, as well as patient expectations (e.g., of expecting a curative treatment) and affordability of other approaches to care (e.g. physiotherapy). This was corroborated by patients:

“I thought there were other things they would give me asides the cream. My expectation was that once I get drugs and use them the pain will go” P3

“Yes, I did see changes but not much. What I want is for my knee not to pain me ever again”. P6

***Maintenance***

Most of the HCPs reported still using elements of the JIGSAW-A model of care and resources at the time of the evaluation and most of them expressed a desire to continue using the approach. However, all said they had run out of the JIGSAW-A guidebooks (the patient explanation package) which appeared to have been a major incentive to using the JIGSAW-A model of care. The main expressed needs of patient participants, which was also reinforced by health professionals, was for more engaging resources in visual / audio formats; and patient support group networks to promote guided self-management and therapeutic exercises in the longer term.

“*I don’t know if JIGSAW Africa, your organisation can do it for us. You will gather us together and train us again at a convenient time and you will bring a physiotherapist on that day to check us so that we can enjoy you for that day. That will not be too expensive for us, that will also help us with this situation” P1*

*“The feedback has been good, …but some of them still find it difficult to read. Not because they cannot read, actually, they still ask that you should put them through. But for people that read it, digest it very well, they still come back to say thank you and that I even gave this one you gave me to another person, which is very, very good.” HCP 8*

Participants also emphasised the need for wider campaigns to discourage over dependence on medicines for the management of osteoarthritis.

*“For such program, we will know the days we have physiotherapy sessions and the token (fees) we need to hold with us. That will also help than using drug at all time” P5*

*“I want to say that you should go to radio station, advertise it. Then just go to all these pharmacists and advertise it”*

***Barriers and facilitators to the implementation process***

HCPs explained that major barriers to implementing the JIGSAW-A model of care were linked to the healthcare system structure and workflow (including lack of agreed and established guidelines to underpin care and reduce variation across settings, lack of truly collaborative/multidisciplinary care, conventional referrals systems that are over-reliant on doctors in secondary/tertiary care. Other key barriers were resources and time constraints. High patient caseload was a barrier relating to time constraints and was cited by most participating community pharmacists and some other HCPs. Under current schedules, with so many patients expected to be seen each day, there seems to be too little time to deliver all of the elements of JIGSAW-A model of care to all patients in community pharmacy settings. The resources provided as part of JIGSAW-A study were limited and without sustained sponsorship and or adoption by the healthcare system, it would be difficult to continue to optimise patient empowerment for self-management through education and provision of these information resources.

From the patient perspective, finances and lack of community/primary-care based services to continue to support self-management are major barriers. Unaffordable consultation and care costs (directly out of pocket expenses or via health insurance schemes that do not cover physiotherapy services) make evidence-informed care that includes physiotherapy led-exercises an unaffordable “luxury”. Many patients expressed their need for care for co-existing LTCs and symptoms alongside improving care for joint pain and osteoarthritis.

*“Including the other problems I mentioned also… You know you are just explaining this one to me, I only glanced through the book without understanding. It is until now that you are explaining to me that I am getting it.” P5*

HCPs expressed that the JIGSAW-A resources increased theirs and patients’ insight and broad experience of self-management of osteoarthritis as an LTC (i.e., that will not be cured by medicines). The resources were also perceived to enhance consultations and patients’ potential to take care of their own health. HCPs further highlighted that for the model of care to be effective and have meaningful impact nationally, widespread HCP training will be needed.. Adaptation of the JIGSAW-A guidebooks in more engaging visual format (i.e., short video) was a desire and perceived facilitator from both patients and HCPs perspective.

**Phase 4: Stakeholder co-design of recommendations for wider implementation**

Following pilot implementation and evaluation in real world settings (in Phase 3), refinement, and optimisation of JIGSAW-A resources was guided by stakeholders. Three CoP workshops were held to define and prioritise recommendations for further scale-out and wider implementation of evidence-based, integrated care for osteoarthritis in Africa. The first was focused on a review of feasibility study data to agree changes/amendment to the JIGSAW-A resources using an adapted Nominal Group Technique24. Subsequent CoP workshops generated draft recommendations and prioritised strategies for wider scale-out and implementation of evidence-informed osteoarthritis care in West-Africa. Strategic priorities and agreed recommendations are presented in Fig. 4.

Figure 4: Stakeholder recommendation for wider implementation of JIGSAW-A

**Discussion**

This feasibility study incorporated stakeholder inputs, patient, and public involvement, and leveraged previous learning and expertise from a similar successful osteoarthritis research and implementation program in Europe (i.e., JIGSAW-E). The diverse nature of the practices participating in the study, in terms of staffing, patient population size, urbanisation and deprivation, suggest that the results should have transferability to other settings in Nigeria and West-Africa. Our findings show that a guideline-informed model of care can progress the understanding and management of osteoarthritis among HCPs and patients; and is feasible to implement in over-burdened health systems and low resource settings. However, addressing key barriers and facilitators would be necessary and the impact of the JIGSAW-A model of care and findings presented in this study needs to be tested for effectiveness in a large adequately powered clinical trial.

Quantitative and qualitative evaluation of implementation process and outcomes of guideline informed osteoarthritis management programs is expanding globally8,18-19, including an emerging body of literature examining osteoarthritis management in community pharmacies20 but there is a paucity of research focused on how people living in Africa with osteoarthritis and joint pain will perceive such programs. To our knowledge this is the first study to focus on the acceptability of written information resource on osteoarthritis and joint pain from the patient’s perspective in West-Africa. We did find that information was an expressed need, and written resource was appreciated, however, Africans appear to want information in more engaging formats such as videos and posters in addition to written information. These findings can help inform the population-wide implementation of this model of care in other regions with similar contexts.

Aside from limited resources and access to physiotherapy services, our study highlights poor integration of multidisciplinary HCPs and services across healthcare settings as a major barrier to effective implementation of guideline-informed care for osteoarthritis. This is similar to findings of previous literature in the field7-8,18-19 and in higher-resource settings. Professional roles, boundaries and patient expectations were also key as community pharmacists in this study, routinely supplied topical analgesics for most of their patients instead of oral analgesics and strong pain killers which was usual practice prior to JIGSAW-A. Our study makes an important contribution to the literature on osteoarthritis care, and acceptability from low-and middle-income country (LMIC)perspective. The current study was a feasibility pilot project in Nigeria, with a view to extend learning, scale out JIGSAW-A innovations within Nigeria and to other countries in West-Africa.

Limitations of the study include that the analyses did not account for repeated visits by patients during the pilot implementation period, due to limited resources for the study. However, the study was set up to answer questions about feasibility of implementation in community settings and with community pharmacies. Whilst being the usual first point of call for patients, and a great point to signpost, we have learnt that fidelity of a full JIGSAW-A model of care may not best placed in a fast-paced business environment without undue pressure on patients and community pharmacies. We did find that JIGSAW-A worked mostly well at the community health centre. Findings of better compliance with osteoarthritis assessment protocol and physiotherapy-led exercises in JIGSAW-A in such sites was not surprising given the expertise and close professional connections with osteoarthritis and joint as a condition. The JIGSAW-A training in such instances served to up-skill professionals and encourage better compliance to guideline informed care.

Though relatively simple to use and enhances health professional behaviour/practice in line with best evidence for osteoarthritis, our point-of-care quality indicator recording template was not well used. Within context, routine recording of care does not usually take place in community pharmacies in West-Africa/LMICs primary care. Future research aimed at maximising the benefit from evidence-based osteoarthritis implementation program should include a focus on wider uptake of routine electronic data collection, which will aid audits, support health professional behaviour changes that can reduce variations in practice and thereby improve patient-level outcomes.

**Implications for future policy and practice**

This study responds to global policy, research and public health priorities by enabling provision of accessible, and high-quality patient explanation packages and osteoarthritis care support-package for community-pharmacies and other HCPs. Participants and stakeholders further recommended more visual, expressive arts and other creative means of giving education and advice for the management of osteoarthritis. This is particularly important in Africa where a high proportion of people living with osteoarthritis may have low-health literacy.

People with osteoarthritis commonly have other LTCs, such as cardiovascular diseases, hypertension, peptic-ulcer, diabetes, anxiety and depression21-22. Future research needs to provide self-management programmes for osteoarthritis in the context of other co-existing LTCs. Equipping community-pharmacies and other HCPs in primary care to support evidence-based osteoarthritis care as a LTC will improve person-centred care and potential risks and adverse effects associated with self-medication misuse and drug interactions9,10 can be mitigated. This will likely have significant impact at population levels.

Although, the team promoted increased confidence in trust-worthy services, a major barrier to the implementation of JIGSAW-A model of care with heavy reliance on community pharmacies was time and the potential loss of income from promotion of non-pharmacological approaches to osteoarthritis management. For effectiveness, evidence-based care programs for osteoarthritis such as JIGSAW-A should also be established in community health centres with links to local networks of community support groups promoting supported self-management. Such implementation approach is likely to enhance efficient care-pathways, and effective multidisciplinary team approach to management of osteoarthritis, optimising the use of public and individual resources.

**Conclusions**

JIGSAW-A pilot is to our knowledge the first example of the implementation of an osteoarthritis management programme in primary or community care settings in West-Africa. Our feasibility study showed that community pharmacies in low-resource settings can be supported to deliver aspects of evidence-informed osteoarthritis management as a first point of call. However, given fast-paced, community pharmacy settings, well contextualised care, consistent with international evidence-based guideline recommendations may be better placed in community healthcare centres. In addition to more adequately powered research evidence, commitment of care commissioners, collective partnership of stakeholders is now needed to establish effectiveness and support translation of evidence into practice in these settings. This will provide people with osteoarthritis better quality of life, and reduce socio-economic inequalities associated with living with osteoarthritis as a long-term condition.

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**Contributors**

All authors were involved in the study design, data analysis, and revision of the manuscript. All authors read and approved the final manuscript. OB is the guarantor.

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**Competing interests**

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi\_disclosure.pdf (available on request from the corresponding author). Early findings from this study were presented at the 2024 OARSI World Congress on Osteoarthritis, Vienna, Austria April 2023. Babatunde et al. Co-contextualising and Implementing evidence-based care model for osteoarthritis: Nigerian case study in the Joint Implementation of Guidelines for OSteoArthritis in West-Africa (JIGSAW-A).

**Ethical approval**

The institutional review board of Keele University and the University of Ibadan approved this study.

**Data sharing**

No additional data available.

**Transparency declaration**

The lead author affirms that the manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

Table 1. Summary of site data (extracted from consultation logs and HCP self-reports)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Site code |  |  | Demographics | | | | | | Assessment & management Plan | | | | | | | | | | | |
|  | *OA patients per day (average)* | *Total no of Patient consultations (JIGSAW-A) 3months* | *%Chronic* | *Gender ratio (M:F)~* | *% Obese/ Overweight* | *% other LTCs* | | | Assessment as per protocol | Education on OA & Joint Pain (inc. JIGSAW-A booklet) | Advise: Self-Management | Prescribed pain medications | Prescribed topical analgesics | Imaging/ Diagnostic Tests | Recommend Exercise | Prescribed equipment (e.g. walking aid) | Referral - Physiotherapy | Referral - Orthopaedic /Others | Red flags (JIGSAW-A algorithm) |
| *Urban* |  |  |  |  |  |  | | |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | Hypertension | *Diabetes* | Others |  |  |  |  |  |  |  |  |  |  |  |
| A1001 | 13 | 43 | 75 | 12:5 | 44 | 84 | 30 | 30 | 5 | 43 | 43 | 23 | 43 | 28 | 43 | 3 | 0 | 14 | 5 |
| A1002 | 8 | 23 | 100 | 1:2 | 57 | 13 | 52 | 9 | 0 | 23 | 15 | 23 | 23 | 0 | 17 | 1 | 0 | 0 | 0 |
| A1006 | 8 | 35 | 48 | 1:4 | 29 | 31 | 17 | 14 | 3 | 35 | 34 | 14 | 35 | 4 | 34 | 2 | 13 | 1 | 3 |
| A1007 | 10 | 39 | 97 | 1 | 74 | 59 | 59 | 21 | 0 | 39 | 39 | 39 | 39 | 13 | 29 | 1 | 24 | 13 | 0 |
| A2001 | 5 | 60 | - | 1 | 43 | 48 | 42 | 18 | 60 | 60 | 60 | 7 | 60 | 9 | 60 | 7 | 0 | 7 | 60 |
| A3001 | 11 | 44 | 54 | 5:8 | 75 | 68 | 34 | 20 | 44 | 44 | 44 | 13 | 5 | 7 | 41 | 5 | 0 | 4 | 44 |
| Rural |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| A1003 | 4 | 51 | - | 11:3 | 57 | 49 | 45 | 12 | 10 | 51 | 51 | 35 | 51 | 7 | 42 | 3 | 2 | 5 | 10 |
| A1004 | 7 | 41 | ~85 | 4:7 | 76 | 56 | 61 | 10 | 0 | 41 | 41 | 41 | 41 | 11 | 26 | 1 | 22 | 15 | 0 |
| A1005 | 6 | 33 | - | 13:4 | 55 | 42 | 27 | 18 | 5 | 33 | 33 | 7 | 33 | 3 | 30 | 0 | 7 | 3 | 5 |
| Total | 72 | 369 |  |  | 510 | 450 | 367 | 152 | 127 | 369 | 360 | 202 | 330 | 82 | 322 | 23 | 68 | 62 | 127 |

- not reported, ~ estimated

***Supplemental Table. JIGSAW-A IMPLEMENTATION AND EVALUATION (USING Re-AIM Framework)***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RE-AIM Domains | Concept operationalised | Outcome Target Level(s) | Measures/data source | Sample Quotes |
| Reach | HCPs and participating sites  Absolute number, proportion and representativeness of >45yrs with OA that participates in JIGSAW-A | Provider level (HCPs)  Individual | 1. recruitment data with participation rate 2. representativeness of HCPs and people living with OA participating 3. JIGSAW-A resources/dissemination products use/uptake – HCPs consultation logs and interviews | “First priority now and how we have used the guidebooks is for patient education” HCP7 |
| Effectiveness | Reflective of the success of JIGSAW-A in improving quality of care for people living with OA | Provider level (HCPs)  Individual | 1. Impact on HCP practice – interviews 2. Patient self-reported Quality Indicators of care for OA (% achieved) 3. Patient perception of JIGSAW-A program/resources and self-management - patient feedback/interviews | “I’m more conscious of the fact that we you don't need X-ray to diagnose osteoarthritis” HCP1  “So upon thorough examination and then I'm satisfied that OK, this patient can do well on exercise and diet like improving their way of life instead of just medications. So now I recommend exercise, diet, proper diet to my patients and I also illustrate to them how they can exercise, and many of them have come back with good feedback that is actually helpful” HCP2  “most of the times, the orientation or let me say the mentality that most of them have before is that the best solution or the only way to their problem is either to be on analgesic for a very long time or get a new support or any form of support. And ever since we've started introducing this guideline to them, we've been having a very, very positive result and the rate at which some of them even consume analgesic is reduced compared to the way it was.” HCP7  “Yes, I do exercise, I also have what I use to massage the legs, I also have hot water bottle. Also, when I wake up in the morning, I have to raise the legs on the bed and I try to do most of them. They’re easing the pain gradually” P4  “Infact, the tablet I used to take, I may stay for few weeks to a month without taking it. I only do the exercise. Infact, if I want to go to xx, I will leave my car here and just troll and there and come back” P11  Referring to the guidebook: “It is all encompassing since it contains everything that is wrong with us. It is like they saw us before they wrote it”. P5 |
| Adoption | Proportion, and representativeness of HCPs who train and uses JIGSAW-A in practice.  Regulatory bodies interests & uptake of JIGSAW-A | Provider level (HCPs)  Organisations | 1. Information from training and site visits. 2. HCPs interviews 3. Organisational engagements | “before the JIGSAW training, I don't really emphasize about their diets, or exercise. Yes, because it was not a concern. So basically, I recommended medications and supplements. I recommend gels or analgesic sprays” HCP2  “Our priorities: educating patients about their condition, importance of self-care, importance of lifestyle changes which include weight management and importance of exercise aligns with the JIGSAW A model of care. It aligns with that approach too, because I feel like that's basically what the JIGSAW-A is about; Self-management, weight management exercises. Yes, that's what I think we are doing”  “Actually, what we do before JIGSAW is that when they complain like that, before we commence any treatment, we usually refer them to the lab and to run scans. Which JIGSAW has made us see that it is not necessary to allow the patients go through that kind of stress before the person can be diagnosed of having osteoarthritis” HCP7  “Well, before JIGSAW started, I'm not really a fan of you do so much of exercise to support your joint. So I believe so much in nutritional supplement Condroitine, glucosamine, MSN and other ones that works. But ever since I had training with JIGSAW, I believe more in exercising those joints rather than you taking so much of supplement. Even though I still give supplements. But at least that goes a long way, alongside with the JIGSAW recommendation” HCP1. |
| Implementation | HCPs fidelity to JIGSAW-A+ model of care/protocol.  High priority on context specific analysis from qualitative data. | Provider level (HCPs) | 1. Consistency of implementing JIGSAW-A+ as intended, adaptations made during delivery assessed via site visits aided 2. Notes on local adaption at implementing sites assessed during site visits 3. Interviews | “If there is a need to I refer, I refer them to other healthcare professionals” HCP1  “The training has helped me to be mindful of the terms, the words I use, so as not to create any negative psychological impact on these patients as regarding their pain” HCP7  “There’s need for more collaboration. Everybody has their own professional jurisdiction and all of us need to look at how best can we help patients. So I would say that here, if JIGSAW A can bring all of us together, why not? For myself I would say that yes, it opened my eyes so that I can actually work more with physiotherapists”HCP6  “But in most cases after we have a very short discussion guide with the patient, we give them the material that is given to us, which is very, very informative and it's very, very precise, straightforward. So most of the patients we give it to them to still go and read and come back and some of them will come back to give us the feedback”. HCP3  “And also, I try to give them positive words as much as possible. I don't say death sentence, like it won’t be repairable again. So you're conscious of the kind of language being used” CP2  Yeah, it's very essential for health professionals to collaborate on the management of OA and that will really help us in Nigeria. We still have a long way to go, but at least we can start from like networks -collaboration between health professionals in the proper management of patients with OA. HCP 8 |
| Maintenance & Sustainability | Individual patients’ motivation for self-management and HCPs practice maintained/continues to be informed by JIGSAW-A in the longer term. | Individual  Provider level (HCPs) | 1. Individual level maintenance: continued interest in and incorporation of self-management (interviews) 2. HCP practices post-implementation (interviews) 3. Broader stakeholder engagement/ additional JIGSAW-A training delivered/requested | “JIGSAW A. is more of a physiotherapy tailored kind of something to be very honest. I'm a pharmacist so I would have my own different professional perspective and physiotherapy deal more with physical therapy and how that can be helpful. I may be wrong but pharmacists, do both pharmacological and pharmacological ways to help our clients. So I would think if JIGSAW A and pharmacists work together, it could work because we need each other” HCP8.  Readability and Literacy: “Africans are not used to reading : The feedback has been good, though we still have some of them that Nigerian mentality? No, not only Nigerians. You know, Africans. Just like they use to say, which is not 100% true, that the best way to kill A to kill a black man is to put it into writing. I'm just joking, but some of them still find it difficult to read. Not because they cannot read, actually, but some of them are still very, very awkward in terms of even if you give them the Yoruba version to read, they will still come back and still ask you that they still don't understand that you should put them through. And you later discovered that they didn't even read it the way they're supposed to. But for people that read it, digest it very well, they still come back to say thank you and that I even gave this one you gave me to another person, which is very, very good”. HCP1  The food palette…that if I am to follow them I will use all my salary on feeding. You have you go and look at the realities of our nutrition. So you can make realistic recommendations to the people. Medical services are too expensive so many people will rather self-medicate than come to a doctor. I think that is the issue and I don't know how your organization can step in. Even self-medications are getting expensive so many people are resulting to herbs. The problem now is some people are lucky it works for them. But it gets to a time that it will not work, that is why we have an increase in liver problems” P5  “especially these fruits... It has been useful to me alot. I buy watermelon, orange and other fruits. Before, I don't use to take fruits. But now, I take fruits and vegetables very well. But the cost implications! If you want to buy little banana now, they can say 200 or 300 naira. Then the government, I don't know what to say about them. How they will decrease the inflation?” P3  “Yes, the guidebook was easy to read but I thought they should have monitored me and ask us to come for regular session” P2 |
| Barriers & Facilitators | Sample Quotes | | | |
| Barriers | “I believe in physiotherapist, if there is an opportunity or privilege, they can go for physiotherapy but for most patients, such luxury is not available” HCP7  “we can know what exactly is wrong with them because it is due to their poverty level that they didn't go for physiotherapy that is number one. Secondly, I want them to create awareness, for instance where I am now we have about 32 villages around and I don't have the opportunity to see them all but if some other people can be trained to explain to other people, that will go a long way” N1  “what I think about the diet we ought to be taking, right? Do you think we can follow this thing in Nigeria? It is really good but the monetary aspect is not easy. It is not realistic!”  “It was mentioned to me but I didn't get a copy”  “They just gave me the book yesterday that I should look at and this Is what I should buy. They showed me the low and high quality. But I don't have money. But they told me this one is the best one and I went for it. I still owe him money for this for him to give me better one. P3  “I have had several tests but I believe the ones I did at the physiotherapist place is the only solution to my problem. Since the other week at XXX physiotherapy, and I observed there were changes, but I didn't have money to go back to them. P9 | | | |
| Facilitators | “And then also I look forward to when there will be like osteoarthritis group like maybe support group for the osteoarthritis patients around here like they just have a support group where they come together to discuss about what they're going through and also there will be professionals to attend to them, maybe some of the facilities for exercising or maybe tell them about their health, their nutrition, what they're supposed to eat and what they're not supposed to eat”. HCP 7  “even if you give them the Yoruba version to read, they will still come back and still ask you that they still don't understand that you should put them through. And you later discovered that they didn't even read it the way they're supposed to. I say that we should make it in an audio form, and something catching in form of a poster that will give the basic information at once and that will be fine”  “Well, it's just a book, so maybe videos like the exercise, demonstrating to patients how it's been done or maybe like a JIGSAW support group that will be like something that has to be online, like one-on-one conversation”. HCP2  “So I think the training has gone a long way but it has to be something that is sustaining”. HCP3 | | | |

A screenshot of a computer

AI-generated content may be incorrect.A diagram of a health care program

AI-generated content may be incorrect.A graph of different colored lines

AI-generated content may be incorrect.A diagram of a patient voice

AI-generated content may be incorrect.A diagram of a patient procedure

AI-generated content may be incorrect.