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Perspective

Time to reframe osteoporosis: a position statement to characterize the osteoporosis care gap

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Abstract

Osteoporosis, a condition marked by increased fracture risk, remains under-diagnosed and under-treated worldwide, resulting in a substantial "treatment gap"—the difference between those eligible for osteoporosis treatment and those who actually receive it. While the concept of closing the treatment gap is commendable, and has galvanized clinical and policy efforts, this position statement argues that the prevailing narrative is in danger of becoming disease-focused and parentalistic, neglecting person-centered care. An international consensus group, including public contributors with lived experience were convened to define and characterize the "osteoporosis care gap" as a broader framework, encompassing deficits not only in pharmacological treatment but also in diagnosis, assessment, and multi-disciplinary management. The care gap is thus defined as "the discrepancy between the care provided to those at risk of osteoporotic fractures and best practice, person-centered care." Multi-level determinants of the care gap are identified including: societal—low public awareness underpinned by unhelpful stereotypes, and prevalent health inequalities; health policy—insufficient prioritization, diagnostic confusion, and lack of incentivization; healthcare service—fragmented care pathways with unclear roles and poor communication, inadequate follow-up, and insufficient support for shared decision making; and individual—unmet needs for care which is person-centered, participatory, understandable, equitable, holistic and multidisciplinary, and respects autonomy. The statement calls

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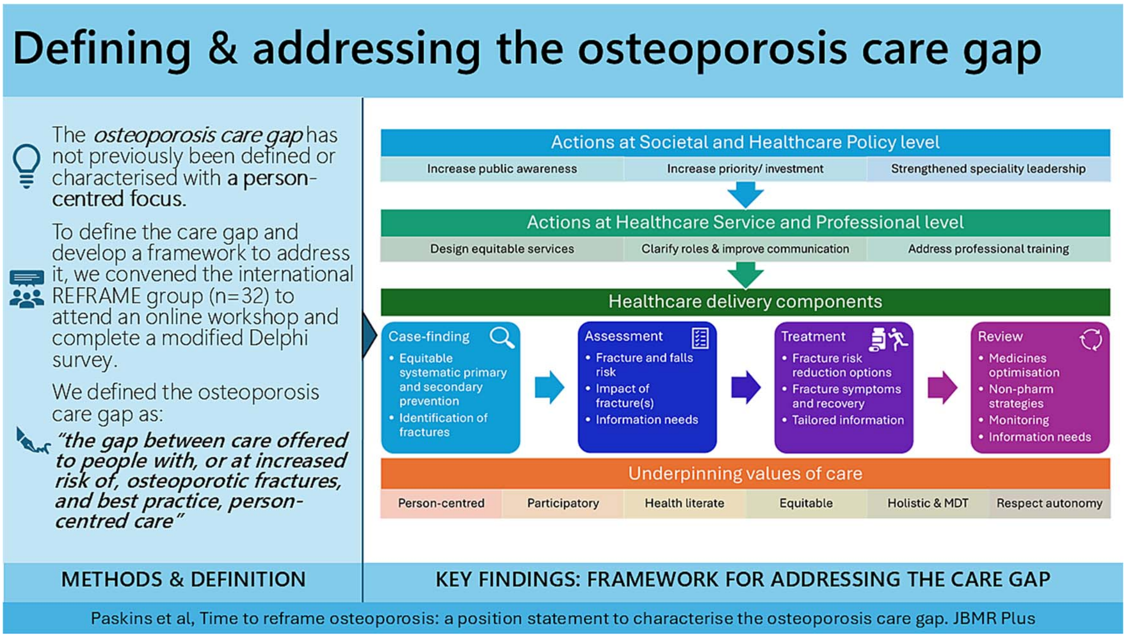
for a person-centered, equitable, and multidisciplinary approach to osteoporosis care, integrating the perspectives and needs of patients, families, and caregiver. Actions needed at societal and policy level are described, including increasing public awareness, increasing health policy prioritization, with clear professional leadership. The components of osteoporosis care are described in terms of case finding, assessment, treatment, and review. Addressing this, care gap requires coordinated efforts from policymakers, healthcare services, and professionals, with a renewed focus on equity and patient values and preferences.

Keywords osteoporosis, fracture, care gap, adherence, treatment gap

Lay Summary

Many people who might benefit from osteoporosis assessments or treatment are not offered them and many people offered or receiving treatment feel their needs are not met. Barriers include lack of awareness, confusing diagnosis rules, poor communication, and a tendency of healthcare systems to focus on medicines rather than the whole person. This statement suggests we need to look at the "care gap"—not just who gets medicine, but who gets the right assessment, diagnosis, treatment, and support. To help people with osteoporosis, care should be fair, addressing the whole person, and tailored to each person's needs, with support for making informed choices.

Graphical Abstract



Defining & addressing the osteoporosis care gap

The *osteoporosis care gap* has not previously been defined or characterised with a person-centred focus.

To define the care gap and develop a framework to address it, we convened the international REFRAME group (n=32) to attend an online workshop and complete a modified Delphi survey.

We defined the osteoporosis care gap as:

"the gap between care offered to people with, or at increased risk of, osteoporotic fractures, and best practice, person-centred care"

Actions at Societal and Healthcare Policy level

- Increase public awareness
- Increase priority/ investment
- Strengthened speciality leadership

Actions at Healthcare Service and Professional level

- Design equitable services
- Clarify roles & improve communication
- Address professional training

Healthcare delivery components

Case-finding
- Equitable systematic primary and secondary prevention
- Identification of fractures

Assessment
- Fracture and falls risk
- Impact of fracture(s)
- Information needs

Treatment
- Fracture risk reduction options
- Fracture symptoms and recovery
- Tailored information

Review
- Medicines optimisation
- Non-pharm strategies
- Monitoring
- Information needs

Underpinning values of care

- Person-centred
- Participatory
- Health literate
- Equitable
- Holistic & MDT
- Respect autonomy

METHODS & DEFINITION

KEY FINDINGS: FRAMEWORK FOR ADDRESSING THE CARE GAP

Paskins et al, Time to reframe osteoporosis: a position statement to characterise the osteoporosis care gap. JBMR Plus

Introduction

Osteoporosis is characterized by increased propensity to fracture, with fractures having significant personal, societal, and economic consequences. Globally, osteoporosis is under-diagnosed and under-treated. For the last decade, key opinion leaders have raised concerns about the significant osteoporosis "treatment gap." This represents the large proportion of people who, despite being at increased risk of osteoporotic fragility fractures, are untreated for osteoporosis, estimated at 74.6% across Europe.[1]

The "treatment gap" has most recently been defined as "the 'gap' between those individuals who require treatment and those individuals who actually receive treatment."[2] Closing the "treatment gap" is a major goal of advocacy groups, healthcare services, and professionals, through improving identification, risk assessment, and addressing barriers to adherence (the extent to which people take prescribed medications as recommended).

There is a danger that the concept of "closing the treatment gap" misaligns with what matters most to patients, because of the focus on disease and drug treatment rather than the person. An alternative lens through which to consider deficits in care, is the osteoporosis "care gap." First described in 2004, this term refers to deficits in healthcare (eg, diagnosis) as well as pharmacological treatment of the condition.[3] However, "care gap" is used less frequently than the "treatment gap" and has varied definitions with some authors referring to "care" and "treatment" gap interchangeably.[4–8]

This position statement presents the results of a workshop and Delphi exercise aimed at defining the osteoporosis care gap and providing a framework to address it.

Materials and methods

To define the "osteoporosis care gap," we convened the REFRAME group, comprising 32 representatives from 6 countries. Members were invited to an online workshop to discuss the problem and a call to action, and to complete a subsequent 3-step modified Delphi survey to achieve consensus on a definition.

Workshop attendees were invited via professional networks and social media, aiming for a diverse mix of clinicians, public contributors (people with lived experience of osteoporosis), and a third-sector organization (the Royal Osteoporosis Society). Twenty-three attended the workshop with the remaining 9 providing feedback afterwards. Nine academic rheumatologists, 4 academic geriatricians, 5 health service researchers, 1 dietician, 1 radiographer, 2 academic physiotherapists, 8 public contributors, and 2 charity representatives contributed. In the workshop and associated pre-reading, literature was reviewed about patient priorities[9,10] and a draft definition and call to action shared. In small groups, the definition was refined and call to action recommendations discussed.

After the workshop, an e-survey was circulated offering 4 possible definitions for the care gap, with opportunity to suggest alternative wording, as well as a question about the optimal explanation of care ($n = 22$ completers). The findings were then shared with respondents, 20 of whom completed a second e-survey including 3 amended definitions with opportunity for free text comment. As formal consensus was not reached, free-text comments informed the final definition, which was approved in a third e-survey ($n = 17$, 100% agreement).

The wording of previous definitions/phraseology included in the e-surveys is included in Supplementary data.

Results

Workshop outcomes

Care gap definition

Following 3 Delphi rounds, the REFRAME group define the osteoporosis care gap as "the gap between care offered to people with, or at increased risk of, osteoporotic fractures, and best practice, person-centered care."

Problem statement: determinants of the osteoporosis care gap

The determinants of the treatment gap have been previously described: poor case finding and management, suboptimal communication and low public awareness, neglect by government and healthcare systems, and lack of data.[11] Here, we expand on these descriptions, based on a review of the literature, supplemented with insights from the REFRAME group workshop, starting with a focus on unmet needs from the individual perspectives of patients, and including contextual factors at levels of healthcare professionals (micro), healthcare services (meso), and healthcare policy and society (macro) (Figure 1).

Micro factors: patient unmet needs

Person-centered care

Patients report that their care is not person-centered. Unmet needs relate to assessment, diagnosis, fracture consequences, and non-pharmacological fracture risk reduction strategies.[12] The process of receiving a diagnosis, assessment, and explanation for symptoms is of importance to patients, yet only 30% of vertebral fractures are clinically diagnosed,[13] only 39% of people with risk factors receive bone health assessment in the UK,[14] and many patients with osteoporosis may not receive a formal diagnosis.[15]

In a UK survey of osteoporosis public research priorities ($n = 1188$), 4 of the top 10 priorities related to the physical, psychological, and social consequences of fracture.[9] Fracture impacts on physical, mental and emotional wellbeing, quality of life, and participation in society. Patients with vertebral fracture do not get their fracture "fixed" and commonly report unmet needs about symptoms.[16] Spiritual impacts of fracture are also described, such as inability to pray.[17]

Participatory care, utilizing shared decision-making

Patients report needing more support with shared decision-making, an important component of person-centered care.[18] This involves supporting patients to understand their risk of fracture and related adverse events, as well as the probability of lowering their risk through interventions, and supporting a decision which aligns with their preferences.[18,19] This gap is perhaps not surprising given the advanced consultation skills needed in communication of risk and uncertainty, an area where healthcare professionals express training needs.[18]

Attending to low health literacy

Patients report that existing information is difficult to understand,[18] suggesting the needs of people with low health literacy are unmet. Health literacy is defined as "the degree to which individuals can obtain, process, understand, and communicate about health-related information needed to make informed health decisions."[20] Low health literacy is universally associated with poor health outcomes including increased risk of non-adherence, hospitalization, and mortality.[21] It is also common, with over 40% of UK working age adults being unable to understand commonly-used health information.[22] Osteoporosis is already poorly understood, with commonly used patient information often being too complex, ambiguous, contradictory, and sometimes inaccurate.[23]

Current treatment gap descriptions feature the interchangeable use of the words "treatment," "therapy," and "prevention." The term "treatment" implies medical care given for an illness or injury rather than prevention; REFRAME public contributors told us "treatment" is perceived as broader than medication and is associated with perceptions that symptoms will improve. They also did considered the word "therapy" to mean non-pharmacological interventions. This distinction has important consequences because patient needs may not be met by osteoporosis "treatment"/"therapy," and second, because the expectation that osteoporosis treatment will provide symptom relief, which it does not, is an important contributor to non-adherence.[24] The term "fragility fractures" is also problematic as "fragility" is not a patient-preferred term[23] and confusion prevails about whether fractures are truly fragility or not, or related to osteoporosis.[18]

Equitable care

The current model of case finding for primary prevention and secondary prevention, where no Fracture Liaison Service (FLS) exists, is opportunistic and not systematic.[25] Public contributors

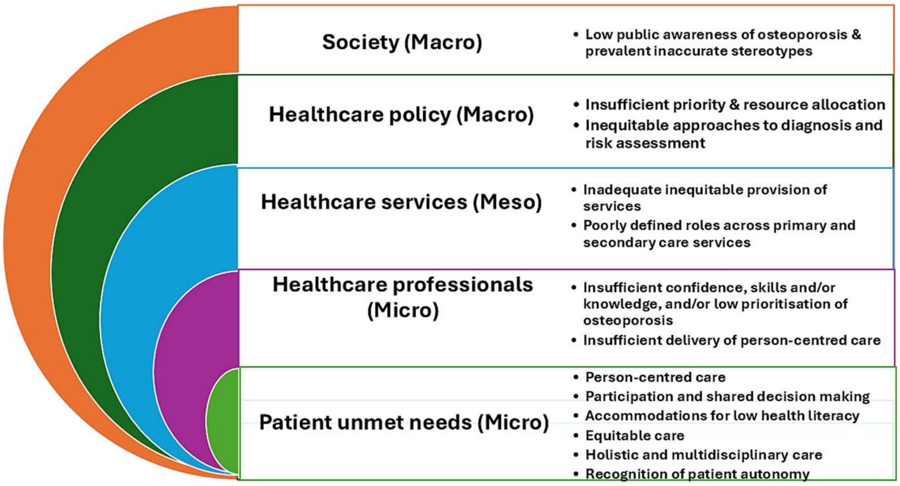


Figure 1 Osteoporosis care gap problem description.

told us that they must push hard for osteoporosis concerns to be addressed by their healthcare providers and that they have concerns for people who do not have the necessary self- or proxy advocacy skills. They also raised that younger adults with osteoporosis, particularly men, can often be overlooked for diagnosis or assessment because of stereotypes of osteoporosis being a condition of older women.

Multidisciplinary and holistic care

Patients report that their preferences to discuss non-pharmacological approaches to fracture risk reduction are not met in clinical consultations,[10,12] and 2 of the top 10 public research priorities relate to non-pharmacological methods of improving bone health, which necessitate a multidisciplinary approach.[9]

Although medications are recognized as the mainstay of osteoporosis "treatment," with the highest level of evidence in support of fracture risk reduction, other interventions, such as exercise,[26,27] smoking cessation,[28,29] alcohol withdrawal,[30] and falls reduction,[31] have been demonstrated to either reduce fracture incidence, or, to increase BMD or attenuate losses, which are accepted proxies for fracture risk reduction.[32]

Furthermore, it is important to holistically consider the whole person, including comorbid conditions, polypharmacy, and life situation, when considering appropriate treatments. For example, pharmacological treatment may be inappropriate for a person with limited life expectancy, or, where treatment of the underlying condition may rapidly normalize bone health.

Respect for autonomy

Evidence-based medicine (EBM) reflects a triad of evidence, consisting of clinical guidelines, healthcare professional experience, and patient preferences and values.[33] By indicating which patients "require" treatment, the treatment gap definition uses paternalistic (or parentalistic, as a preferred gender-neutral term[34]) language and neglects the patient voice as a core EBM component. For example, where a patient makes an informed decision to decline medication based on their own preferences.

While optimizing adherence remains a key goal and outcome associated with fracture reduction, the label "non-adherent" is potentially derogatory, indicating patient failure. Public contributors labeled as "non-adherent" told us they stopped taking oral medications because of side effects, yet were unaware alternatives were available. This suggests the failure, if there is one, is of healthcare systems to adequately review people receiving medicines and/or of health professionals to foster awareness about treatment options, and/or negotiate an acceptable shared decision that fits with the patient's life.

Micro factors: healthcare professionals

Primary care professionals have expressed low confidence and training needs related to knowledge of osteoporosis and its treatments, and, clinical skills, in interpreting bone density scans and fracture risk scores.[25] These gaps are likely to impede the extent to which the healthcare professional can effectively promote shared decision-making. Furthermore, FLS clinicians have expressed training needs relating to person-centered care and communicating risk.[35]

United Kingdom qualitative research with FLS and primary care professionals suggests that their goal is to optimize adherence with pharmacological treatment, with little focus on fracture symptoms.[18] Furthermore, FLS proformas used to guide the content of consultations do not include any information relating to symptoms, impact, or care of the index fracture.[35]

Meso factors: healthcare services

Fracture Liaison Services represent a global model of care to standardize the secondary fracture prevention pathway.[36] However, globally, less than 50% of people receive secondary fracture prevention, quality of services vary, and most services discharge people after 12 mo of follow-up.[35,37]

Lack of clarity between the roles of specialist FLSs and primary care may contribute to undertreatment.[38] Follow-up beyond FLS and primary prevention is opportunistic and not systematic leading to inequity in care.[25,39] This is reflected in qualitative research which describes people's delayed diagnosis and need to request follow-up and review.[10,40]

Macro factors: policy

In contrast with other non-communicable chronic diseases, osteoporosis has not attracted commensurate attention from health providers.[11] United Kingdom research with primary care practitioners identified that the barriers to implementing evidence-based osteoporosis care include the lack of incentivization, associated quality indicators and funding.[25]

In addition, osteoporosis-specific policy and guidelines may contribute to inequities in management. Evidence suggests that most patients experiencing fragility fractures do not meet the WHO's operational definition for osteoporosis (BMD 2.5 SDs or more below the young female average (T score ≤ -2.5)).[41,42] Despite the existence of an additional conceptual definition of osteoporosis describing the phenotype of bone fragility, research from multiple qualitative studies with patients, and primary care professionals highlight a reluctance to take or prescribe osteoporotic medications for people with a T score > -2.5.[16,24,43] This, coupled with the fact that many people are not offered BMD testing (due to clinical guidelines and/or availability) means that many people will not receive a formal osteoporosis diagnosis or explanation.

The absence of diagnosis associates with the size of the treatment gap. In a cross-sectional observational study across 8 countries involving 3798 women eligible for pharmacological treatment based on fracture risk, the treatment gap was larger in those without a BMD-defined diagnosis (94.1% without vs 30.9% with).[1] Receiving a diagnosis is important to help make sense of the condition and guide decision making about health behaviors, including adherence.[44] A multi-center international study of postmenopausal women at high fracture risk identified that participants with self-reported osteoporosis diagnosis ($n = 284$) were more likely to be motivated to initiate osteoporosis medication than participants without a diagnosis ($n = 48$; $p < .01$).[45]

Additionally, there remains a gap in the most appropriate way to diagnose osteoporosis and assess fracture risk in minoritized ethnic groups. The WHO BMD definition was based on the epidemiology of predominantly White women and thus leads to an overinflated prevalence in other ethnicities, such as East Asians.[46] While there are ethnic differences in fracture risk, the inclusion of fixed adjustments for ethnicity in fracture risk algorithms has been criticized for not taking into consideration the broader social determinants of fracture risk, and, for omission of ethnic groups historically excluded from research, among other reasons.[47]

Macro factors: societal

Low public awareness of osteoporosis has been previously highlighted as a contributory factor to the treatment gap, noting osteoporosis is commonly confused with osteoarthritis and/or dismissed as inevitable aging.[11] In addition, osteoporosis has received little media attention compared to other long-term conditions, and stereotypes exist about osteoporosis being a condition of older White women, being self-inflicted due to poor lifestyle choices and, about kyphosis being normal aging.[48]

It is well recognized that social factors, such as employment, income, gender, and ethnicity influence health outcomes. Specific to osteoporosis, under-served groups less likely to receive assessments or treatment, include men,[14] ethnic minority groups,[49] people living in areas of deprivation,[50] care home residents,[51] people with learning difficulties,[52] and dementia.[53–58] However, few editorials or empirical research papers referring to the treatment gap discuss health inequities (6/32 identified, 2015-2025).

There is intersectionality between some characteristics associated with being under-served by healthcare, and risk factors for fracture, meaning those at highest risk may paradoxically be least likely to be offered interventions. For example, people living in areas of deprivation may be more likely to smoke and people living in care homes represent a group with a number of risk factors (eg, dementia, falls). Furthermore, people with some "under-served" characteristics, including being of black heritage, living in areas of increased deprivation and having dementia, are subject to worse outcomes from osteoporotic fractures.[59–61] Importantly, some people from under-served groups may lack the capacity, skills and/or knowledge to do the "work" required to adhere to treatment, meaning that more tailored management plans are needed.[62]

Discussion: Call to action

REFRAME members discussed a framework for addressing the care gap (Figure 2), and a call to action for policy makers, healthcare systems, professional bodies, individual healthcare professionals, and patients as summarized below. Tables 1 and 2 expand on the underpinning values and the components of osteoporosis healthcare.

Underpinning the call to action is the need for use of clear consistent language. We propose the use of "osteoporotic fractures" instead of "fragility fractures" and using medication or pharmacological treatment where indicated, instead of "therapy." We suggest the "treatment gap," which remains an important metric to influence change, is redefined to the proportion of patients eligible for osteoporosis pharmacological treatment who remain untreated. Those eligible should have clinical characteristics, where there is robust evidence for benefit of osteoporosis pharmacological treatments.

For policy makers and healthcare systems

Addressing the care gap requires urgent action to improve equitable case finding, timely diagnosis, and multidisciplinary treatments that meet patient needs. This depends on health system prioritization and funding, as well as better integration across primary, secondary, and tertiary care, and among providers of bone health, falls prevention, and imaging services. This requires leadership at the highest level to complement, support, and coordinate the various professional bodies involved in osteoporosis care.

Organizations, such as WHO and other guideline bodies, may wish to consider a revised consensus on the definition of osteoporosis to help healthcare professionals communicate it to patients and address potential disparities affecting minoritized ethnic groups.

For professional bodies, charities, and interest groups

The prioritization and integration described above requires coordination and leadership within the bone health field. The multi-speciality (eg, endocrinology, rheumatology, geriatrics, and clinical biochemistry) nature of osteoporosis is both a strength and a barrier; messages can be fragmented across specialties. REFRAME

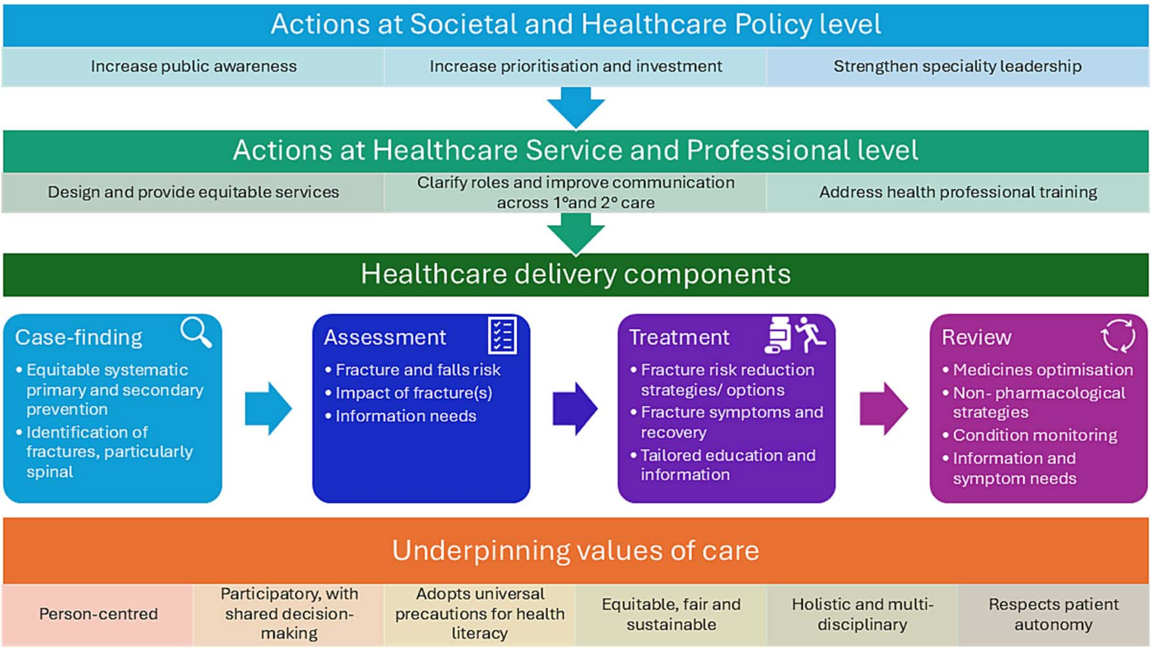


Figure 2 Framework for addressing the osteoporosis care gap.

Table 1 Underpinning values of osteoporosis healthcare, addressing patient unmet needs.

Underpinning values of osteoporosis healthcare	
Person-centered care	• Considering the patient preferences and goals, medical history, quality of life expectancy and life situation • Offer treatment choices based on evidence and/or recommended best practice appropriate to the specificities of the patient's characteristics and situation
Participatory, with shared decision making	• Be person-centered and personalized to the needs of the individual, using shared and informed decision-making principles and available high-quality tools were appropriate • Be designed in partnership between the healthcare professional and individual and, if appropriate, their family members and/or caregivers, to improve and maintain physical, mental and emotional health, social participation and quality of life
Universal precautions[a] for health literacy	• Use plain language • Give information in "chunks" and regularly check understanding
Equitable, fair, and sustainable	• Systematic, not opportunistic case finding • Equitable and inclusive of everyone, including under-served communities • Be commensurate, including that people receive care proportional to their potential for benefit
Holistic and multi-disciplinary	• Attend to both non-pharmacological and pharmacological treatment options • Multi- and inter-disciplinary across the entire patients' care pathway, ideally spanning from hospital to home harmoniously integrating all available services, inclusive of healthcare, social care and supported self-management, where appropriate
Respect for autonomy	• Ensure that everyone is treated with dignity, compassion and respect • Respecting the person's right to choose not to take medicine following shared and informed decision making

[a] Because low health literacy is challenging to identify, the recommended strategy is to take "universal precautions" and ensure that all communications are in clear plain language.[63]

therefore suggests that it may be time for bone health to become a recognized sub-specialty. In the meantime, professional bodies, charities, and interest groups should incorporate the care gap into their strategies and priorities, and actively promote multidisciplinary collaboration, clarify professional roles, and build capacity for quality improvement, using the components of osteoporosis care outlined in this position statement to form the basis of quality indicators.

For research funders and researchers

More data is needed to understand the extent of the osteoporosis care gap in under-served groups and its wider impact. We then need research on how to effectively, efficiently, and equitably close the care gap, with patients as strategic partners, using scalable, sustainable, and digitally optimized solutions. It is imperative that patient needs (including those of under-served popula-

Table 2 Components of osteoporosis healthcare.

Components of osteoporosis healthcare	
Case finding	• Primary and secondary fracture prevention identification of adult patients based on risk of fracture and osteoporosis and not access to healthcare • Identification of those with low or no trauma osteoporotic fractures, particularly spinal and other major osteoporotic fractures
Osteoporosis and fracture risk assessment	• Appropriate timely risk assessment based on comprehensive approach to identify diseases and drugs affecting bone health and investigations including bone density scans where needed and available • Impact of fracture(s) • Information needs
Treatment options and information	• Fracture risk reduction strategies, including: ■ Pharmacological treatments personalized to patient's fracture risk ■ Lifestyle changes including diet and exercise which promote bone health and reduce falls risk ■ Reducing falls risk ■ Identification and treatment of secondary causes of osteoporosis • Management of patient needs relating to fracture symptoms and recovery, including: ■ Quality of life ■ Pain, physical, and psychological function ■ Ability to undertake self-care and activities of daily living ■ Emotional and spiritual needs ■ Social participation, education, and employment • Tailored patient education and information, which is accessible, understandable, useable and ■ Clearly trustworthy and evidence based ■ Addresses individual information needs, expectations, and goals ■ Clearly explains osteoporosis and its treatments ■ Advises on fracture symptom management ■ Explains what to expect from healthcare services ■ Supports self-management ■ Supports shared and informed decision-making ■ Supports patients to ask questions
Review	• Medicines optimization[a] • Non-pharmacological treatment review (eg, exercise, nutrition) • Monitoring of the condition, including re-review of falls and fracture risk • Review and address fracture impacts, as outlined above • Elicit and address information needs for individuals, their family and caregivers • Onward referral as needed (specialist, occupational therapy, physiotherapy, falls)

[a] Medicines optimization is a broad construct which includes optimization of adherence but also includes other importance outcomes, such as minimizing side effects, appropriate treatment discontinuation, medicine switching (optimizing efficacy), reducing waste, and shared and informed decision making.

tions) are identified and addressed with inclusive interventions.

While medication adherence is important as a recognized proxy measurement of fracture reduction, we recommend researchers consider a broader range of evaluations and outcomes associated with patients' experience of care and research priorities.

For individual healthcare professionals and patients

Change is needed to ensure patients understand their eligibility for care, including access to appropriate assessments, pharmacological and lifestyle-based treatments, supported self-management, and timely follow-up. Patients should expect, and health professionals should deliver, equitable, person-centered care, including informed, and shared decision-making. Health professionals should be supported to address patient needs and expectations, respect patient autonomy and decision making, address their own training needs, and partake in data-driven service improvement.

Strengths and limitations

A strength of this position statement is the inclusion of nine lay co-authors. Despite an international authorship, most authors are UK-based and as such the determinants and call to action may be particularly written with a UK lens. We have painted an ideal picture, recognizing that available resources and evidence limit current progression in some areas. For example, while patients describe a need for better condition monitoring, there remains a dearth of evidence on clinically and cost-effective monitoring approaches. Finally, we recognize the REFRAME team only includes one primary care representative and no policymakers or orthopedists.

Conclusion

In conclusion, we have critiqued the parentalistic and pharmacologically-orientated narrative around osteoporosis and proposed an alternative person-centered and equitable approach. To achieve tailored, personalized, inclusive, multidisciplinary, and evidence-based care we recommend a change in narrative, to place the person with osteoporosis firmly in the center, and, re-emphasize the “care” in healthcare.

Author contributions

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Supplementary material

Supplementary material is available at *JBMR Plus* online.

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Conflicts of interest

Z.P. has received non-promotional consultancy fees from UCB Pharma. Keele University has received sponsorship from UCB Pharma. B.H. reports consultancy and/or speaker’s fees from UCB Pharma, Amgen, EffrX, Theramex, and Thornton Ross and funding to her institution from Kyowa Kirin, and UCB, outside the submitted work. M.K.J. has received paid consultancy or sponsorship for external talks from Amgen, UCB, Sanofi, Kyowa Kirin, Nanox, and Naitive. O.S. has received non-promotional consultancy fees from UCB Pharma and Pharmacos. NDORMS, University of Oxford has received unrestricted research grants UCB, Amgen, and Kyowa Kirin. T.O. has received speaker’s fees from Amgen and Zuellig Pharma Eli Lilly. D.J.A. has received consultancy and speaking fees from UCB Pharma and Theramex, and payment for work on bone health from the European Milk Forum. He has received payment from the European Milk Forum. C.R. has received paid consultancy or sponsorship for external talks supported by Amgen and UCB. S.R. reports research funding to his institution from the Royal Osteoporosis Society, the Kennedy Trust, Kyowa Kirin, and UCB, outside the submitted work and unrestricted educational grants from Pfizer, Abbvie, Kyowa Kirin, Alexion, Amgen, Cellgene, Bristol Myers Squibb, Janssen-Cilag, Novartis, Eli Lilly, Thornton & Ross, Sanofi Genzyme, Sandoz, and Roche, outside the submitted work. R.M.D. reports consultancy and/or speaker’s fees from Abbott Australasia, Nutricia, and Fresenius Kabi and educational grants from Abbott Australasia, outside the submitted work. M.K.J. is a Clinical lead for Royal College of Physician’s Fracture Liaison Service-Database (FLS-DB) of England and Wales and Treasurer for Fragility Fracture Network (FFN). E.C., D.J.A., Z.P., M.K.J., S.R., T.O.N., C.G., and B.H. are Clinical, Scientific and Academic Advisors for the Royal Osteoporosis Society (ROS). C.J. is a member of the ROS Research and Innovation Grants Assessment Panel. C.G. Chairs the National Osteoporosis Guideline Group (NOGG). Z.P., K.P., N.V., and D.J.A. are NOGG members. T.O. is a member of the Malaysian Osteoporosis Society and co-chairs the Malaysian Clinical Practice Guideline Management of Osteoporosis. C.R. is the co-chair of the Italian Osteoporosis Society. R.M.D. is a member of the medical and scientific advisory committee of Healthy Bones Australia. J.M., V.F., C.T., and N.V. are patient advocates for the ROS. I.B., D.F., K.S., E.L., and I.B. are members (public contributors) of Keele’s research user group. C.S. and S.L. are employed by ROS. E.C. is a trustee of the Royal Osteoporosis Society. I.B., D.F., A.H., F.B., E.C., D.D., R.M.D., V.F., C.G., J.G., R.J., C.K., E.L., S.L., J.M., E.N., T.O., K.P., C.R., K.S., C.S., C.T., and N.V. declare no commercial conflicts of interest. The views expressed are those of the authors and not necessarily those of the NIHR, NHS, Department for Health and Social Care, NOGG, ROS, FLS-DB, FFN, the Malaysian or Italian Osteoporosis Society. E.C. held the position of Associate Editor for *JBMR Plus* and has been recused from reviewing or making decisions for the manuscript.

Data availability

All available data is within the manuscript and supplementary files.

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