

Osteoporosis, (bone) fractures and fracture liaison services

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IMPACT OF THE DISSERTATION

This dissertation contributes to optimize osteoporosis (bone fracture) management and in particular the knowledge on clinical effectiveness and economic value of the fracture liaison service (FLS). An important strategy to optimize fracture prevention is to ensure that patients at highest risk of (subsequent) fractures are timely diagnosed and treated. That is the main focus of FLS care, which is nowadays widely advocated as the most appropriate and effective approach for secondary fracture prevention, including patient identification, education, risk evaluation, treatment, and long-term monitoring. This chapter reflects on the impact of the research described in this dissertation on clinical practice, science, and society.

Clinical practice

The findings of this dissertation provide useful information for clinical practice. With regard to osteoporosis (bone fracture) management, our studies reveal that anti-osteoporosis drugs are generally cost-effective in men and women aged 60 years and older with prior fractures or with osteoporosis, patients can gain not only clinical benefits (prevent fractures) but also economic benefits. Besides, the additional health benefits indicated by sequential therapy (compared to monotherapy) and potential cost-effectiveness in very high risk population provides more options for clinical practice since it is important for clinician to know how to discontinue or change treatment at a certain point in the evolution of the disease to maintain the efficacy of prior therapy. In addition, exploring the reasons behind poor medication adherence and making patients understand their fracture risk is crucial for osteoporosis management. We found the awareness of osteoporosis in both patients and healthcare professionals is low, contributing to missed opportunities to prevent future fractures. To communicate patients' fracture risk, the written content of the letter (e.g. using clinical or statistical jargon) from the healthcare professionals is poorly expressed and/or not well understood by the patient given their limited health literacy. Using simplified plain language in the combination of online tools to convert the probability of fracture into patient-friendly visual presentations (e.g. bar graphs or stoplight color systems) could facilitate communication between healthcare professionals and patients. An optimal patient-centered approach by making sure that patients feel free to ask questions and express their concerns could also be helpful.

Regarding post fracture care program such as the fracture liaison service (FLS), on the one hand, we indicated wide implementation in clinical practice should be encouraged as FLS is associated with reduced subsequent fracture rate as well as economic benefits in patients with a recent fracture. On the other hand, the

intensity and quality of the FLS seem important to determine the success of the FLS implementation, therefore positive initiatives should be reinforced in clinical practice. For example, implementing a clear and efficient fracture pathway in digital hospital systems is important for case finding; understanding the reasons behind non-attendance and tailored care could be helpful to increase the attendance rate and get more patients treated; setting up the collaboration between primary care physicians, secondary care health professionals and pharmacists could monitor adherence to therapy; using online tools and resources provided by the International Osteoporosis Foundation could also optimize the national clinical management of FLS.

Science (research)

With regard to scientific impact, several studies in this dissertation fill the knowledge gap and contribute to science in the field of osteoporosis (bone fracture). First, two systematic reviews (Chapters 2,3) were conducted and provided an overview of cost-effectiveness of interventions for osteoporosis in men and women separately and issues regarding the study quality were reported. Given the increasing role of economic evaluation in informing decision-making about resource allocation, the research results would be relevant/interesting for reimbursement process, suggesting anti-osteoporosis medications are a good way of allocating resources. Besides, we marked the knowledge gap in economic evaluation in men with osteoporosis, the most frequently unreported criteria as well as the inappropriate use of model input data (especially in male studies) would be helpful for future researchers to close the knowledge gap and to improve the transparency and quality of the economic evaluation in the field of osteoporosis. Second, a scoping review (Chapter 4) was conducted to explore the current status of medication adherence, the reasons of non-adherence as well as strategies for fracture risk communication. The information would contribute to optimize osteoporosis management in clinical practice and address the importance of awareness of osteoporosis in both lay and healthcare spheres. Effective communication and shared decision making could increasingly put into practice. Third, a systematic review and meta-analysis (Chapter 5) was performed to investigate the impact of FLS on subsequent fracture and mortality rate. Although this is not the first study exploring the clinical effectiveness of FLS, our study was conducted with strict inclusion criteria and highlighted the frequently neglected methodological issues (such as comparability of two cohorts, competing risk of mortality, immortal time bias, and longer follow-up period). Our recommendations would be useful for future research to improve study quality and obtain valid estimation of clinical effectiveness of FLS. Fourth, another two studies (Chapters 6,7) placed the first study exploring health-related quality of life and the interchangeability instruments in patients with a recent

fracture presenting at an FLS. We highlighted the importance of avoiding selection bias in the stage of study design and noticing the differences in utilities by different instruments given healthcare decisions could be compromised when researchers or decision-makers are not aware of potential differences in utilities. Fifth, two model-based economic evaluations (Chapters 8,9) suggested the cost-effectiveness of FLS, provided positive signal to widely implement FLS and highlighted the necessity of reinforcing positive initiatives to improve the quality of FLS. These information would be useful for informing policy/regulatory/financial incentives and optimizing the implementation of FLS in real-life settings.

Society

Osteoporosis and bone fractures are a major concern for public health and are associated with substantial and escalating health and financial burden given the aging population. However, osteoporosis as a silent disease remains largely underdiagnosed and undertreated, poor treatment initiation and adherence is especially marked in high-risk patients. In the face of these challenges, this dissertation has important societal impact as it is directed to the management of patients with osteoporosis and bone fractures as well as the optimization of post-fracture care program. More specifically, it has impact on practical and policy implications to reduce healthcare and economic burden in the society.

This dissertation suggests anti-osteoporosis medications are a good way of allocating resources and the FLS is associated with clinical and economic benefits. It also highlights the necessity of increasing awareness of osteoporosis in both lay and healthcare spheres, the importance of effective communication (using patient-centered approach) to make patients understand their fracture risk and better adhere to therapy, and the benefits of widely implementing FLSs and optimizing the quality of the FLSs. These information provided by this dissertation would be useful for decision makers (can be payers, politicians, clinicians or other member of decision-making boards) in the healthcare setting to introduce some positive initiatives in clinical practice to identify more patients at risk of fracture and get more patients treated and adhered to therapy, to stimulate policy or financial incentives to support and optimize the osteoporosis management and FLS implementation, and finally in turn to lower the fracture risk and reduce the burden clinically and financially.