

REVIEW

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Operative secondary prevention of fragility fractures: national clinical standards for fracture liaison service in Egypt—an initiative by the Egyptian Academy of Bone Health

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Abstract

Background: Despite a broad spectrum of effective anti-osteoporosis therapies and a growing number of older adults worldwide, the number of people receiving appropriate secondary fracture prevention is not yet optimum or achieved its expected target, i.e., avoiding refracture.

Main body: To close this gap in the patients' care, and in concordance with the International Osteoporosis Foundation (IOF) as well as international organizations recommendations, the Egyptian Academy of Bone Health and Metabolic Bone Diseases has launched specialised healthcare system for fracture liaison services (FLSs). FLS is a small team of healthcare professionals who identify, investigate, initiate therapy and arrange for follow-up plan over time, for people aged 50 and above presenting with a fragility fracture. Such comprehensive service requires operative clinical standards which would help to standardise the service across the different centres to become effective and sustainable. An estimated 71.8% of the Egyptian population currently have access to a local FLSs. This article aims at setting up evidence-based standards of post-fracture care and provide the necessary index for efficient implementation of secondary fracture prevention in the different FLS centres in Egypt.

Conclusion: The Egyptian FLS clinical standards agree with the international protocols and are an effective approach to target interventions to the properly identified patients at risk. The Egyptian model has identified 19 key performance indicators to measure the effectiveness of fracture liaison services and guide quality improvement.

Keywords: Fracture liaison service, Clinical standards, Fracture Liaison Service, FLS, FLS Egypt, Osteoporosis, Fracture, Fragility fracture, Egyptian Academy of Bone Health, IOF

Background

Osteoporosis is the most common chronic bone disease that affects the bones' structure as well as the strength and makes them prone to fractures. These fractures are usually called fragility fractures as they tend to occur after low trauma which normally would not cause a bone to break [1]. The World Health Organization (WHO) has

identified a fragility fracture as “one which occurs due to forces equivalent to a fall from a standing height or less”. Recently, the new concept of imminent fracture risk has been introduced into the osteoporosis field. Imminent fracture risk has been defined as a significantly higher risk of sustaining a fracture within the 12–24 months after the initial (first) fracture [2–4].

Fragility fractures cause significant negative impact on the person's life which is attributed to the significant drop in the subject's mobility, quality of life as well as ability to work or function [5, 6]. The rise in morbidities linked to fragility fractures is greater than can be associated with

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just aging and therefore represents a major clinical challenge [7]. On another front, an increase in mortality has been linked to the fragility fractures too [8–12]. Consequently, an understanding of the factors leading to fracture is an important research point, which in turn would facilitate management approaches to identify those subjects at high risk of sustaining a fracture and effectively lessen the disease clinical burden.

Worldwide it is estimated that one in two women and one in five men will sustain a fragility fracture after the age of 50 years [13]. In Egypt, the prevalence of osteoporosis was reported at 28.4% in women and 21.9% in men; whilst 26% of men and 53.9% of women were reported to have osteopenia [14]. In a cross-sectional study [15] carried out, in the year 2016, to assess fracture risk among older adults living in geriatric homes in Egypt, results revealed that the prevalence of fractures was 21%. The most prevalent risk factor of fractures was recurrent falls (49%). The recently published consensus on treat-to-target approach for osteoporosis in Egypt [16] endorsed the Fracture liaison service, with a high level of agreement amongst its recommendations. This was in concordance with the Capture the Fracture® initiative launched by the International Osteoporosis Foundation to facilitate the implementation of coordinated multi-disciplinary models of care for secondary fracture prevention. Secondary prevention of fractures is recognized as the single most important step in directly improving patient care and reducing spiralling fracture-related healthcare costs worldwide. The global program includes 49 countries and 682 fracture liaison services. On the first of September 2021, 13 FLS centers have started providing their services in Egypt for the patients presenting with fragility fractures all over the country. FLSs have been reinforced by the evidence signifying that they are clinically and cost effective.

The objective of this article is to set evidence-based standards of post-fracture care that both the patients as well as healthcare professionals expect. The standards are projected to address the entire FLS pathway.

Main text

Fracture liaison service (FLS): the concept

FLS is a crucial constituent of a comprehensive and integrated strategy to minimize the risk of fractures and falls among people older than 50 years old. Assessment within FLS should be offered to every patient admitted or presented with low trauma fracture. The most common skeletal sites of fragility fractures are the hip, spine, wrist, humerus or pelvis. It should be highlighted that a significant percentage of vertebral fractures do not come to clinical attention and they are reported as incidental finding in the radiology reports [17].

The structure of the FLS must be set up to deliver optimum secondary preventive care in the local setting. Internationally, FLSs have been established in the hospital setting [18], in primary care organisations [19] and, in Health Maintenance Organisations (HMOs) [in the United States] [20]. Locally, in Egypt, the optimal FLS model of care has been agreed to be in the secondary care—hospital setting, where most, if not all, of the fractured patients receive their orthopedic surgery management.

FLS is centred around an FLS Lead Clinician who would establish a multi-disciplinary group to design the local FLS model of care; and a devoted FLS coordinator who operates to pre-agreed protocol to case-finding and consequently assessment of the patients who present with a fragility fracture. An integrated care pathway should be agreed with other specialities dealing with patient fractures such as orthopedic and radiology departments. A quality improvement process to develop the FLS should be monitored with ongoing auditing of the FLS to confirm that the fragility fracture sufferers receive appropriate assessment and long-term care (Fig. 1).

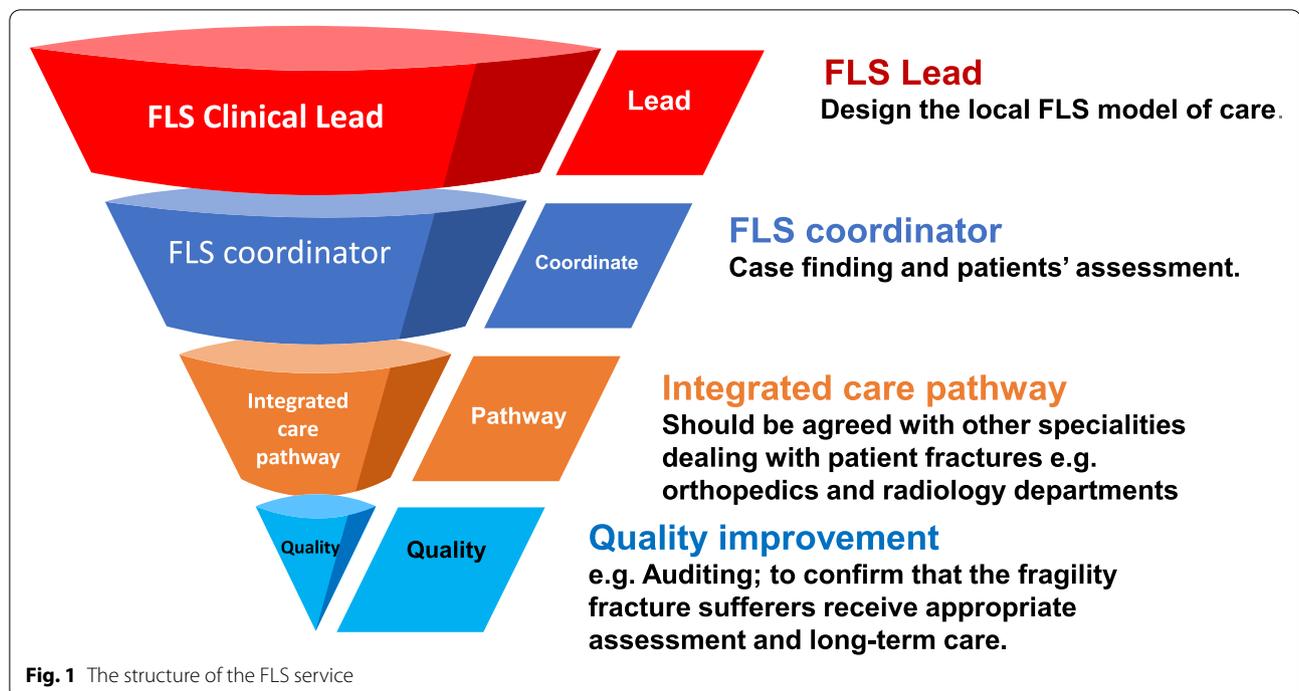
Clinical standards for fracture liaison service

All relevant professional organisations [21, 22], have recognised the need for universal access to FLSs. In 2015, the Royal Osteoporosis Society (ROS) in the UK published standards drafted by a multidisciplinary group which were endorsed by all relevant national professional organizations and IOF [23]. The ROS standards were based on the '5IQ' approach, relating to the key functions of an FLS including the following: (1) identification; (2) investigation; (3) information; (4) intervention; (5) integration and quality. In concordance, the clinical standards for FLS in Egypt have adopted similar approach with some amendments (Table 1).

Key performance indicators

The identification of the parameters that reflect the service performance and outcomes are not only the key factors for the service improvement, but also indicators for aspects of the service that require further development. Consequently, the impact of these developments on the service delivery can be evaluated in a later assessment. The Egyptian framework identified 19 key performance indicators to assess the Egyptian FLSs at the organisational level (Fig. 2). Among these are the 13 standards proposed by The Capture the Fracture Best Practice Framework (BPF) [29] and identified as key performance indicators for measuring the FLS scope.

Other values of these key performance indicators are comparative analysis of the FLSs across different organizations at the global level, namely the global rates of



identification, fracture as well as falls risk assessment, categories of management, communication, and monitoring. These standards are helpful for recognizing major gaps in the delivery of the service such as types of the identified patients presenting with fractures and the continuity of the follow up process. On the other hand, they are less helpful for supporting established FLSs achieve their peak potential targets for preventing secondary fractures.

The clinical Standards in Lay-man's terms for the people receiving the care

Education for patients, family and carers are vital to achieve optimum FLSs utilization and should be incorporated into the contemporary clinical standards. Representing one of the evidence-based care parameters, these clinical standards should be available for patients in simplified style. Each unit should describe what each standard means to adults over the age of 50 who sustain a fragility fracture. By clarifying the main standards of the service, the patients will be able to have informed dialogue with their healthcare professionals. Figure 3 shows the FLS clinical standards in a patient-friendly format.

Data base

Egyptian Academy of Bone Health and Metabolic Bone Diseases has commissioned its own electronic data recording for the FLSs in Egypt. The Fracture Liaison Service Database (EABoM) is a clinically led, web-based

national software for secondary fracture prevention in Egypt. The EABoM comprises 9 Components: patient's data, survey, DXA results, lab results, fracture and falls risk, sarcopenia risk, reports, demographics, and statistical analysis. It facilitates not only recording of the patients' data in their initial visit, but also all their data in the follow up visits. Its statistical analysis tool facilitates the auditing process and evaluation of the services provided against the clinical standards as well as the FLS agreed key performance indicators/outcomes as well as the national guidelines for osteoporosis management.

Implementing the FLS standards

Several factors should be considered when setting up a model for FLS. These include the presence of current pathways, the local network as well as the facility of collaborative work with other departments such as orthopedic surgery, geriatrics, and radiology. Also, it may vary depending on local resources and the local health system facilities as well as priorities. However, the advantage is that adopting these standards is expected to facilitate the opportunity of replicating the principles of evidenced-based best practice effectively across the country. Setting up any new service necessitates time and dedication. Over the past 2 years, the Egyptian Academy of Bone Health has provided bespoke and expert support to launch the FLS in different centers across Egypt. This was carried out through online virtual meetings and in other occasions through inviting international speakers

Table 1 Clinical standards for fracture liaison service in Egypt

Standard	Principle	Basis	Parameters	Clinical Measures
Identification	Who are the targeted patients?	<p>Identification of the targeted patients meeting the criteria of the FLS service.</p> <p>The patients can be recruited from:</p> <ul style="list-style-type: none"> -Orthopedics/orthogeriatrics inpatients (hip/non hip fractures) -Outpatients *Fracture clinic *A&E -Radiology: X-ray reports *Referrals 	<p>Targeted patients: women and men of 50 years and older who sustained a fragility fracture.</p> <p>These patients will be proactively and systematically identified as candidates for the FLS; including:</p> <ul style="list-style-type: none"> -Identification (all fragility fractures) -Identification of vertebral fractures -Imminent fracture risk -Repeated fractures -Incidental vertebral fractures noted in X-ray reports 	<p>This includes patients presenting with fractures to</p> <ul style="list-style-type: none"> -Accident and Emergency Departments (hospital), -Private/community-based accident and emergency medical clinics -Primacy care centres -Accidentally identified in X-ray Department. * In the occasion that in a local population, if the total fragility fractures number is not known, it can be estimated by multiplication of the total number of hip fractures occurring in men and women aged 50 years and over by a factor of 5 [24].
Investigation	Evaluation of the secondary fracture risk	<p>Investigations to evaluate both the fracture as well as falls risks with further assessment of associated secondary causes for osteoporosis, are offered to the patients reviewed under the FLS.</p>	<p>Fragility fracture sufferers will undergo an assessment for:</p> <ul style="list-style-type: none"> -Fracture risk probability (Table 2) -Bone mineral density -Trabecular bone score -Vertebral fracture assessment -Falls risk assessment (Table 3) -Sarcopenia risk -Cognitive assessment -Blood test for bone profile and kidney functions. -Functional disability assessment (Table 4) 	<p>The proportion of fragility fracture sufferers identified who undergo:</p> <ul style="list-style-type: none"> *Bone mineral density measurement within 12 weeks of the fracture presentation in accordance with the Egyptian Guidelines for osteoporosis management [16]. In some cases, the treating HCP may decide that clinical assessment of a specific patient might be sufficient to commence osteoporosis therapy without measuring the patient's bone mineral density (BMD) testing to confirm the diagnosis of osteoporosis, e.g., those patients who have had BMD assessment in the last 2 years; or subjects for who, proceeding to immediate osteoporosis management is considered clinically appropriate. *Falls risk assessment within 12 weeks of the fracture presentation *Assessment of sarcopenia risk by using SARC-F questionnaire (Table 5)

Table 1 (continued)

Standard	Principle	Basis	Parameters	Clinical Measures
Intervention	Initiation of treatment including medical therapy	Interventions to decrease the risk of sustaining a fragility fractures are presented to the patients as required.	<ul style="list-style-type: none"> * Onset of therapeutic effect * Effective follow-up * Exercise to promote bone strength * Patients with very high or high fracture risks will be offered therapeutic management according to the guidelines [16]. * Patient with high falls risk: referred for interventions to reduce falls risk. * Supplementary therapy * Patient with vitamin D deficiency should be managed according to the guidelines [16]. 	<p>Osteoporosis therapy should be commenced within 12 weeks of the new fracture presentation in accordance with the national guidelines [16].</p> <p>There is a growing evidence that starting osteoporosis therapy under an FLS in the instant post-fracture period is associated with improved adherence to therapy [18, 25–28].</p> <ul style="list-style-type: none"> -Special care should be given to osteoporotic patients who fracture whilst they are on osteoporosis therapy. -Patients with high falls risk, should be referred for evidence-based interventions to lessen falls risk within 12 weeks of the presenting fracture. -Post-fracture rehabilitation program <p>To include:</p> <ul style="list-style-type: none"> * Patient centred care. * Reassess at 16-weeks and 52 weeks. * Monitoring of functional disability and HRQoL. * Monitoring of the response to the post-fracture rehabilitation program. * Monitoring of the sarcopenia measures. * Assessment of compliance to therapy.
Integration	Patient pathway and follow-up	Integrating with the healthcare system at a wider scale to ensure the inclusion of patient pathway; facilitate operative case finding, onward referrals and long-term plan of treatment of osteoporosis.	<ul style="list-style-type: none"> Long-term management plan should be agreed with the patient and care team aiming at: <ul style="list-style-type: none"> -Reduction of the fracture risk -Reduction of the falls risk -Adjustment of any metabolic bone abnormality (serum calcium/ vitamin D) -Follow-up plan for monitoring of therapy -Long-term osteoporosis therapy management plan. 	
Information	Patient/carer education Medical Staff education	Informative data and care are offered to the patients, reviewed under the FLS. Support is also provided to carers whenever appropriate	<ul style="list-style-type: none"> Providing targeted information tailored to the patient's needs. Patients who sustained a fragility fracture, their family/carers will be provided with leaflets to inform them of the following: <ul style="list-style-type: none"> -Bone health, -Muscle Health -Nutrition -Lifestyle measures -Osteoporosis therapy options. -self management: 1. Understanding of where to get more information; 2. Involvement in management plan; 3. Patient motivation -Group education -Falls and fragility fracture newsletters. 	<ul style="list-style-type: none"> -Information package available in the patient's preferred format: <ul style="list-style-type: none"> - Written/brochures - Electronic - YouTube channel of Bone Health. - Social media page - Website Illustration of an evidence-based information resource [16].

Table 1 (continued)

Standard	Principle	Basis	Parameters	Clinical Measures
Quality	Performance indicators	The FLS proves clinical liability, effective governance, service enhancement and professional progress	<ul style="list-style-type: none"> *Annual audit of the outcomes/adherence to therapy *Annual audit of the of the quality of FLS service delivery according to adherence to Standards 1–5 *maintenance of the FLS staff appropriate CPD (Continuing Professional Development). 	To include the following: <ul style="list-style-type: none"> *Yearly audit against the FLS Clinical Standards. *The first year audit of the FLS will provide a baseline for future assessment of the performance against the 5 standards. *Review of relevant CPD undertaken by FLS staff and identification of training needs

A&E Accident and emergency, FLS Fracture liaison service, HRQoL Health-related Quality of Life, CPD Continuing Professional Development, SARC-F: SARC-F sarcopenia questionnaire, BMD bone mineral density

Table 2 Fracture risk assessment: FRAX model

تقييم مخاطر حدوث الكسور (FRAX)	
<input type="checkbox"/>	حدث كسر بأحد عظامي نتيجة صدمه (خبطه) بسيطه:
<input type="checkbox"/>	واحد من والدي أو كلاهما كان يعاني كسر في مفصل الفخذ:
<input type="checkbox"/>	أنا أخذ عقار (دواء) الكورتيزون:
<input type="checkbox"/>	لدي التهاب المفاصل الروماتويدي:
<input type="checkbox"/>	أنا الدخن حالياً:
<input type="checkbox"/>	أنا أشرب أكثر من 3 وحدات مشروبات كحوليه في اليوم:
<input type="checkbox"/>	لدي مرض مزمن آخر: ما هو؟.....

as well as the IOF masters with experience in setting up the FLS centers. Locally, the academy also provided assistance with induction and training of the FLS coordinator; advice regarding relevant protocols and care pathways for the service; as well as advice regarding data collection and methods of analysis, reporting and evaluation.

An estimated 71.8% of the Egyptian population currently have access to a local FLS. However, the strategies implemented for providing the service may vary according the resources and staffing.

Working with national guidelines

These FLS clinical standards have been set up to be implemented adopting the national guidelines [16] for the assessment and prevention of fragility fractures as well as falls, in addition to management of osteoporosis. Also, to prevent the development of any further fractures after the primary one. Clinical protocol has been developed and shared across the country to be implemented locally. The osteoporosis management algorithm set in the guidelines provide a road map which support all the 5 FLS clinical standards identified in this report. This

ensures harmony and equivalence of the management approaches all over the country.

Discussion

The gap in osteoporosis care recognized after fragility fractures is noticeably growing. The cause for this care gap to exist and continue is multifaceted [21]. One of the major contributing factors is the un-clarity concerning where clinical responsibility lies [30]. Neither orthopedic surgeons who manage the acute fractures nor the primary care health care professionals who are responsible for provide long-term patient management, appear to be interested in getting engaged in secondary fracture prevention [2–26, 29, 30]. The net result is poor provision of proper pre-emptive measures to prevent subsequent fractures. By developing and applying these clinical standards, evidence-based best practice can be implemented and effectively simulated across the country. This will help to enhance the patients' outcomes, reduce the future fractures burden and ensure operative and proper use of health resources. FLS may also reduce post-fracture mortality [8–11].

Table 3 Falls risk assessment

تقييم مخاطر السقوط	
<input type="checkbox"/>	لقد فقدت توازني خلال العام الماضي
<input type="checkbox"/>	لدي مشاكل في نظري:
<input type="checkbox"/>	اصبحت سرعة المشي أبطأ / مشيتي تغيرت
<input type="checkbox"/>	قوة قبضتي أصبحت أضعف
<input type="checkbox"/>	كان لي أكثر من سقطة في آخر 12 شهرا

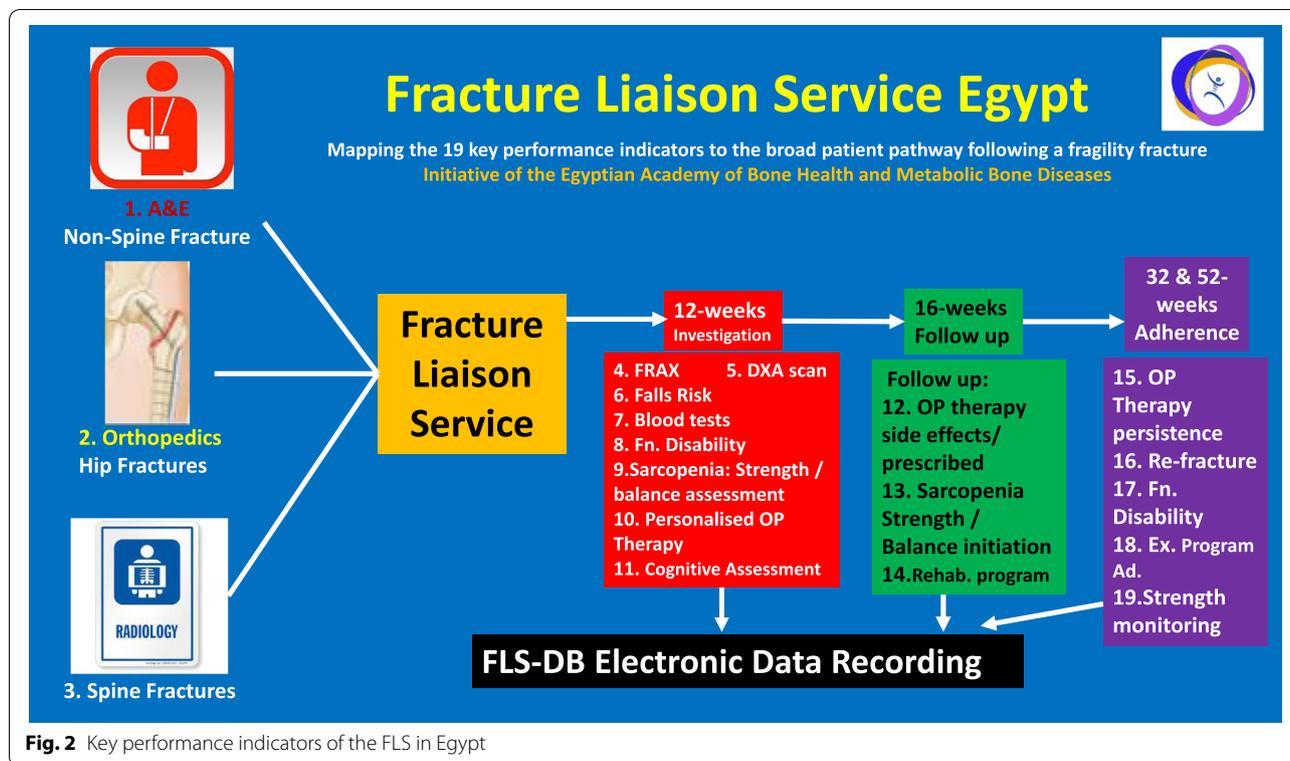


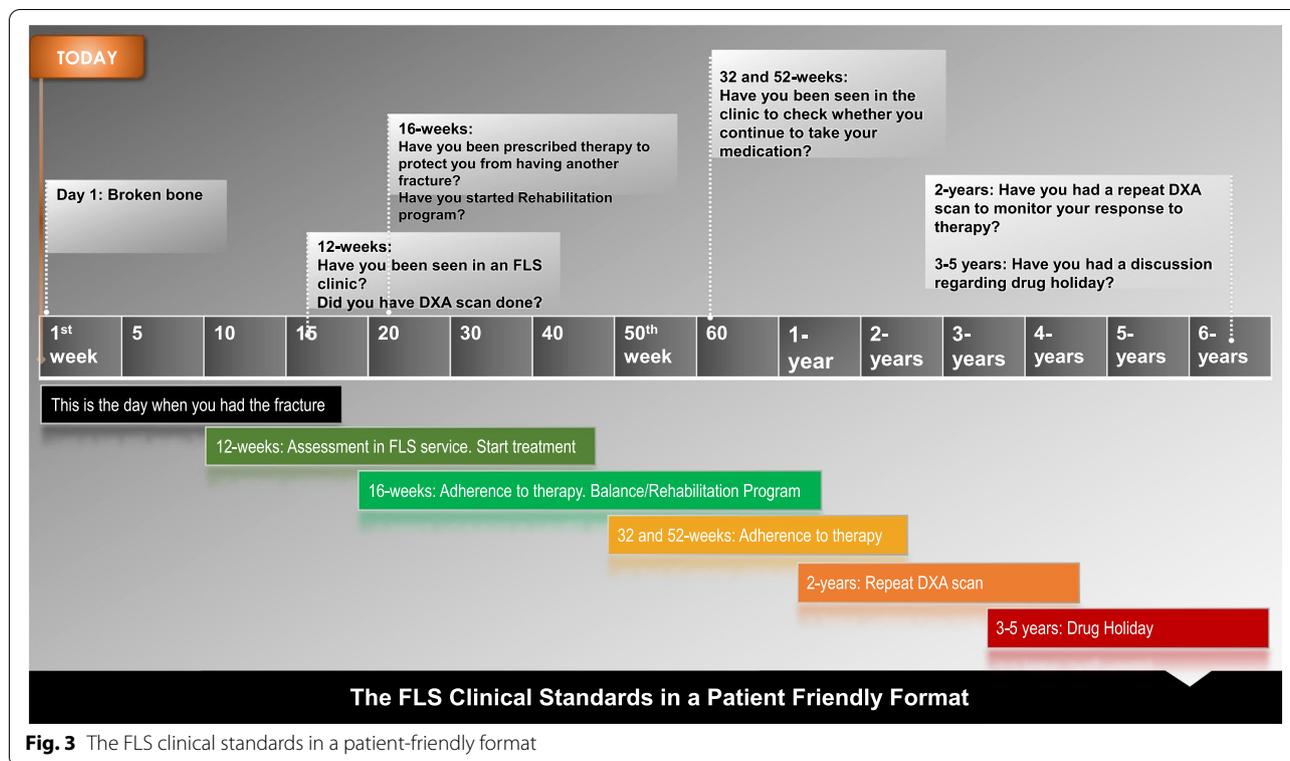
Fig. 2 Key performance indicators of the FLS in Egypt

Clinical Standards for Fracture Liaison Services have been developed in Canada [28] and the UK [21, 23]. The International Osteoporosis Foundation (IOF) has also developed internationally endorsed standards for FLS in the form of the Capture the Fracture® Best Practice Framework [21, 23, 31]. The purpose of these documents is to set evidence-based standards of post-fracture care that health professionals and patients should expect. The Egyptian FLS clinical standards are in agreement with

the international recommendations and were based on the '5IQ' approach, relating to the key functions of the FLS. However, the Key performance indicators identified in the Egyptian model have included 6 more parameters. Four items for risk assessment namely: bone health evaluation, functional assessment, sarcopenia assessment, cognition evaluation; and 2 items for management namely, strengthening/balance exercise, and rehabilitation management program. Fractures have a significant

Table 4 Functional disability assessment

لا أستطيع	بصعوبة شديدة	مع بعض الصعوبة	بدون أى صعوبة	
				* الجلوس والقيام من على التواليت (مرحاض أفرنجي)؟
				* استخدام قبضة يدك لفتح برطمان (علبة) مربى فتحت من قبل أو حمل أنية (حلة) أثناء الطهي؟
				* ارتداء ملابسك، ربط حذائك، تزيير الزراير؟
				* الوقوف بعد جلوسك على كرسي عادي بدون مساند جانبية؟
				* الوقوف لمدة 15 دقيقة متصلة؟
				* تناول وإنزال أشياء بوزن كيلو جرامين (مثل كيس سكر) من مستوى (رف) أعلى من رأسك؟
				* السير خارج المنزل على أرض مستوية؟
				* صعود السلم (الدرج) دورين أو أكثر؟
				* القيام بالأعمال المنزلية (مثل التنظيف أو عمل بعض الأعمال اليدوية البسيطة)؟
				* تحريك شئى ثقيل؟

**Table 5** Arabic SARC-F questionnaire

المعلومات التالية سوف تساعدنا على تقييم مدى صحة عضلاتك
(F-Sarc) استبيان ضمور كتلة الجسم

النقاط	الإجابات المحتملة والنقاط	السؤال	العنصر
	لا يوجد = صفر بعض الصعوبة = 1 صعوبة شديدة أو لا يستطيع = 2	ما مدى الصعوبة التي تجدها في رفع وحمل ٥ كيلو؟	القوة
	لا يوجد = صفر بعض الصعوبة = 1 صعوبة شديدة أو استخدم وسائل مساعدة أو لا يستطيع = 2	ما مدى صعوبة المشي في الغرفة؟	المساعدة في المشي
	لا يوجد = صفر بعض الصعوبة = 1 صعوبة شديدة أو لا يستطيع بدون مساعدة = 2	ما مدى صعوبة القيام من كرسي أو سرير؟	القيام من الكرسي
	لا يوجد = صفر بعض الصعوبة = 1 صعوبة شديدة أو لا يستطيع = 2	ما مدى صعوبة صعود ١٠ درجات من السلم؟	صعود السلم
	لا يوجد = صفر مرة واحدة = 1 مرتين أو أكثر = 2	كم مرة سقطت (وقعت) في العام الماضي؟	السقوط
			مجموع النقاط

إذا كان مجموع النقاط يساوي 4 أو أكثر، فإن ذلك يشير إلى وجود ضمور بكتلة الجسم وعواقبه السيئة

negative impact on the patients' functional abilities as well as health-related quality of life. Fractures are also associated with high rates of morbidity and mortality [32]. The strategy to osteoporotic fracture management should be comprehensive and includes a combination of medical therapy, nutritional management as well as a rehabilitation program tailored to the individual patient's fracture type and risk factor [33]. The target is to improve activities of daily living, reduce the risk of falling and increase safety while reducing the degree of bone mass loss. Therefore, the added parameters are relevant to the FLS clinical standards as it will help in minimizing the risk of having a re-fracture.

Conclusion

Whilst fracture occurrence can be a life-changing experience at the individual's level, with significant negative impact on the persons' mobility as well as consequent negative impact on the subject's quality of life causing social isolation and possibly depression, FLSs present a golden opportunity to minimize these risks and reduce the likelihood sustaining another (i.e., a secondary fracture). The Egyptian FLS clinical standards are in agreement with the international protocols and are an effective approach to target interventions to the properly identified patients at risk.

Abbreviations

IOF: International Osteoporosis Foundation; FLSs: Fracture liaison services; DXA: Dual X-ray absorptiometry; A&E: Accident and emergency.

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Competing interests

All authors declare that they have no competing interests.

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