

Expansion and consolidation of fracture liaison service in New Zealand public healthcare setting – Waitematā District Health Board Experience

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ABSTRACT

aim: To describe the service delivery of the Fracture Liaison Service (FLS) at Waitematā District Health Board (WDHB) for the year 2020, and to outline how the service evolved in recent years.

method: We reviewed and analysed the WDHB FLS database as well as 4-month and 12-month patient follow-up records from the calendar year 2020.

results: In 2020, we identified and assessed 1,225 patients. We either directly initiated anti-osteoporosis medication (AOM) (256), recommended to start AOM with patient's GP (477), or recommended to continue or switch to a different AOM (441) in the vast majority (1174 = 95.8%). In remaining 51 patients, AOM was either deemed unnecessary (owing to relatively young age and good DEXA indices) or patient refused it. Three hundred and thirty dual energy X-ray absorptiometry (DEXA) scans were arranged by FLS, and 79.5% were found to be either osteoporotic (32.9%) or osteopenic (46.6%). At 4-month and 12-month follow-up, 85.1% and 74.4%, respectively, of those expected to be on treatment were on treatment.

conclusion: The WDHB FLS has expanded and consolidated considerably in recent years. Nationwide implementation of effective FLSs should significantly reduce the burden of fragility fractures.

The fracture liaison service (FLS) is a comprehensive secondary fracture prevention programme that has been adopted and implemented internationally, where fragility fracture patients are systematically identified, assessed and managed with the intention of minimising the risk of future fractures.^{1,2} FLSs have been shown to be cost-effective,^{3,4} and FLSs around the globe are supported and evaluated by the International Osteoporosis Foundation (IOF) under their Capture the Fracture® (CTF) initiative on the basis of 13 key performance indicators.^{5,6} In New Zealand, FLSs have been established in nearly all district health boards (DHBs) since the Ministry of Health mandated implementation of FLS in 2015. A facility survey of FLSs in New Zealand in 2020,⁷ and a more recent in-depth national survey of FLSs (unpublished work) conducted by the Accident and Compensation Corporation (ACC) and Osteoporosis New Zealand (ONZ) illustrated a large regional heterogeneity in the quality and breadth of service delivery, with the majority of the FLSs unable to deliver broad and comprehensive secondary fracture prevention for their local population. The ACC recently confirmed their continued commitment to provide funding support of FLSs that are willing and able to deliver secondary fracture prevention in accordance with IOF

CTF's Best Practice Framework.⁶ ONZ, in partnership with ACC, has also committed to provide practical and strategic support to those FLSs that are willing to participate in service improvement to attain CTF Best Practice recognition.

Waitematā District Health Board (WDHB) is the largest DHB in New Zealand, serving over 630,000 residents in the greater Northern and Western Auckland. The WDHB FLS was established in late 2012 and was the first FLS in the country. The FLS had attained Bronze Star recognition from IOF CTF programme⁸ in 2014, and had reported our service establishment and early achievements to this *journal*.⁹ Since 2014, with additional funding support from ACC and WDHB, we were able to significantly grow and refine our service. We are now identifying substantially larger number of fragility fracture patients by having adopted several additional methods of patient identification. We are also providing more streamlined and comprehensive management for identified patients. More recently we started to perform follow-up to ensure treatment initiation and adherence in those needing to be treated. In late 2020, on the basis of our 2019–2020 work, we attained Gold Star recognition from the IOF CTF programme.⁸

In this report we detail our service delivery in the

calendar year 2020, and we discuss factors that have allowed us to expand and achieve current status. We hope that sharing our experience will help other FLSs to deliver more effective secondary fracture prevention. Additionally, we hope to inform other New Zealand healthcare professionals, particularly our primary care colleagues, about FLS in New Zealand; successful secondary fracture prevention relies on good coordination and communication between primary and secondary care.

Methods

Prospectively maintained WDHB FLS database records, as well as 4- and 12-month follow-up data, of patients who were identified and assessed by WDHB FLS in the calendar year 2020 that were reviewed and analysed.

FLS case identification

The WDHB FLS eligible population consists of those over the age of 50 years residing in WDHB area who suffered a new fragility fracture, defined as a fracture sustained from no identifiable trauma or from a low impact trauma such as falling from a standing height or less. Those patients with fractures of any bone in the head, neck, hands, feet, ankle, ribs, sternum and clavicle were excluded.

FLS personnel

The service had two dedicated FLS coordinators with total full-time equivalent (FTE) of 1.6, and both were clinical nurse specialist level. FLS co-ordinators actively identified patients who met our service case identification criteria, and implemented care according to our protocol. The service had two clinicians, both endocrinologists (total FTE 0.1), providing clinical leadership and oversight for the FLS. Any cases that the FLS coordinators needed advice on management were discussed with the clinician. The service also had clerical support worker (0.2 FTE) aiding with data handling and entry, and clinical records management. WDHB FLS worked closely with an orthogeriatrician who provided dedicated medical care of hip fracture patients over the age of 65 years presenting to WDHB. The orthogeriatrician was responsible for reporting to the Australia and New Zealand Hip Fracture Registry.

Case detection

FLS co-ordinators identified cases from a number of avenues. We continued to use daily orthopaedic inpatient lists and outpatient fracture clinic lists. We are now routinely identifying patients from

emergency department (ED) trauma list. Since 2017, we started utilising ACC-generated fracture claims list identifying those who likely had a “FLS relevant fracture” (i.e., over 50 years with a fragility fracture) not already identified by FLS, and send communication letters to those patients and their respective general practitioners (GP), encouraging them to be assessed. Those patients who make contact with FLS, either directly or via their GP, were then assessed. With the intention to detect more vertebral fractures, we started identifying patients with symptomatic or asymptomatic vertebral compression fractures through screening radiology reports. WDHB Radiology Services provided FLS with a pre-selected list of patients whose radiology report (x-ray, computed tomography [CT] and magnetic resonance imaging [MRI] that included thoraco-lumbar spine as region of interest) contained prespecified keywords such as “fracture”, “compression” and “wedge”. FLS co-ordinators then reviewed these patients’ radiology reports and correlated with a clinical history from electronic records to determine if they may have suffered either non-traumatic or low-impact trauma induced vertebral compression fracture. Letters were sent to these patients and their GPs with a recommendation to start treatment and/or have dual energy x-ray absorptiometry (DEXA) scan, where appropriate. Additional cases were also identified through inpatient (mostly general medical and orthopaedic) electronic referrals, GP electronic referrals, and those referred to WDHB for DHB funded DEXA scans with fragility fracture that were not yet detected by FLS.

Assessment

Patients identified and confirmed to be a FLS case, as described above in “*FLS case identification*”, had their medical history reviewed with relevant clinical information prospectively collected and recorded. This included current fracture mechanism and location, past fracture history, previous DEXA scan result(s), and past and current anti-osteoporosis medication (AOM) history. AOM was considered to be one or more of the following: current bisphosphonate treatment or on bisphosphonate “drug holiday”, denosumab, teriparatide, hormone replacement therapy (HRT), and raloxifene. Other relevant clinical information including past medical history, family history, current medications, smoking and alcohol consumption, mobility and exercise, propensity to fall and its risk factors, dietary intake, body weight/ body mass index were routinely sought. For all patients assessed, either face-to-face or via a phone call, falls risk was routinely evaluated using three questionnaires from Health Quality & Safety Commission New Zealand.¹⁰

Investigation

A DEXA scan was routinely performed in those under 75 years of age and in some patients over 75 where the scan result could alter management decision. DEXA scans were at no cost to the patient and were performed by a private DEXA provider, Auckland Bone Density (ABD), contracted by WDHB. All DEXA scans were performed on General Electric Lunar Prodigy densitometers. Management recommendations were provided by the reporting specialist from ABD. Laboratory test results were routinely reviewed for significant abnormalities, and in patients who have significantly low bone density for their age (i.e., DEXA Z-score <-2.0) relevant secondary screening laboratory tests were recommended.

Intervention

Identified patients were either seen on the ward or in fracture clinic, or contacted by a phone call. A clinical history was taken and rationale for further investigation and/or treatment was discussed. Those over the age of 75 were routinely recommended to initiate pharmacotherapy if they were not already on an AOM. Those with hip fractures (<65 years, as those over 65 were managed by our orthogeriatrician) were initiated on treatment as inpatients. For those being referred for a DEXA scan (most patients under 75) AOM treatment decision was made after the DEXA scan has been completed, with pharmacotherapy initiated or recommended to be initiated in appropriate cases. Vitamin D was recommended in appropriate cases (e.g., elderly and those receiving intravenous (IV) zoledronic acid infusion). Procollagen-1 N-terminal peptide (P1NP) was recommended to be checked six months after treatment initiation in those starting oral bisphosphonates. Those deemed to be at high risk of falls were referred to the WDHB falls prevention programme; a community group or in-home strength and balance programme. For all patients assessed by WDHB FLS, a letter with information on assessment, investigation, and relevant treatment plan/recommendation was sent to the patient's GP, with copy of the letter to the patient.

Record keeping and follow-up

Relevant demographic and clinical details of all patients assessed by FLS were recorded using local FLS database spreadsheet. Follow-ups were performed at 4 and 12 months post index fracture for those patients who were expected to be on treatment (i.e., already on treatment prior to index fracture, initiated on treatment by FLS, or recommended GP to initiate treatment). The main aim of the 4-month follow-up was to check treatment initiation in those

where AOM was recommended, and involved reviewing electronic records (TestSafe pharmacy dispensing records system). If AOM dispensing was not apparent, then the patient or the GP practice was contacted by letter or phone call to confirm or reinforce treatment initiation. 12-month follow-up was, again, conducted for those patients who were expected to be on treatment, with the main intention of checking if those expected to be on AOM are adhering to treatment. Additionally, re-fracture events were ascertained.

Ethical approval

Ethical approval was not sought as identifying and intervening on patients with fragility fracture for secondary fracture prevention is expected best clinical care in New Zealand.

Results

Between 1 January and 31 December 2020, WDHB FLS has assessed 1,225 patients meeting our case identification criteria. Patient demographics and general characteristics are as summarised in Table 1. Mean age of the entire cohort was 75.6 years, with those 75 and older comprising 56%. Nine hundred and twenty-eight (75.8%) were female. NZ European comprised 832 (67.9%) patients, and Other European 208 (17.0%). One hundred and eighty-one (14.8%) had history of at least one fragility fracture preceding the index fracture. Four hundred and forty-four (36.0%) were already receiving AOM, the majority (92%) being oral or IV bisphosphonate treatment. Five hundred and fifty-nine (45.6%) patients were identified from radiology report, 305 (24.9%) from inpatient fracture list, 60 (4.9%) from ACC generated list, 156 (12.7%) from ED trauma list, 116 (9.5%) from fracture clinic list, 25 (2.0%) from ward consult referral, and 4 (0.3%) from GP referral. Forty-one (3.4%) patients had a hip fracture, 482 (42.3%) vertebral compression fracture, 154 (13.6%) humerus, 375 (32.9%) wrist/forearm, and 85 (7.5%) had pelvic fracture.

Three hundred and thirty (26.9%) were offered to have a DEXA scan. Thirty-two (9.7%) have either declined this at the time of FLS assessment, or have declined the DEXA appointment or did not attend. Of 298 patients who had DEXA scan performed, 98 (32.9%) were found to be osteoporotic, 139 (46.6%) osteopenic and 61 (20.5%), normal.

Four hundred and forty-one (36.0%) were already on AOM prior to the index fracture, with the majority on either an oral (198 = 44.9%) or IV (201 = 45.6%) bisphosphonates. Eleven (2.5%) were on denosumab, 6 (1.4%) on teriparatide, and 25 (5.7%) were on a "drug holiday". Of 784 who were not on AOM at the

Table 1: Patient demographics and characteristics.

Total no. of patients identified and assessed by FLS	1,225
Mean age (range)	75.6 (50–102)
Gender – female (%)	928 (75.8%)
Ethnicity (%)	
NZ European	832 (67.9%)
Other European	208 (17.0%)
Maori	31 (2.5%)
Pacific	23 (1.9%)
Chinese	58 (4.7%)
Indian	29 (2.4%)
South-East Asian	7 (0.6%)
Other Asian	21 (1.7%)
Middle Eastern	11 (0.9%)
Other	5 (0.4%)
Prior fragility fracture history (%)	181 (14.8%)
Source of patient identification (%)	
Fracture clinic list	116 (9.5%)
Inpatient fracture list	305 (24.9%)
ED trauma list	156 (12.7%)
Ward consult referral	25 (2.0%)
Radiology report	559 (45.6%)
ACC fracture data	60 (4.9%)
GP referral	4 (0.3%)
Location of index fracture (%)	
Hip	41 (3.4%)
Vertebrae	530 (43.3%)
Humerus	158 (12.9%)
Wrist/forearm	403 (32.9%)
Pelvis	93 (7.6%)

time of index fracture, AOM was either not recommended (younger patients with robust DEXA indices) or declined by patient in 51. Of the remaining 733 who were deemed to require AOM, 256 were initiated on treatment directly by FLS; 62 (24.2%) on oral bisphosphonate, 176 (68.8%) IV zoledronic acid, 16 (6.3%) denosumab, and two (0.01%) teriparatide. The other 477 were recommended by FLS to start treatment with their GP, or by a hospital subspecialist in rare instances. Therefore, of 1,225 FLS patients assessed, treatment for 1,174 (95.8%) were either directly or indirectly initiated by FLS, or recommended to be continued or changed.

Referrals to falls prevention programme, either in-home strength and balance programme or community group strength and balance programme, were made in 63 (5.1%) patients.

Follow up at four months revealed that 955 of 1,122 patients (85.1%) who were expected or recommended to have started on treatment, and were alive, were on AOM. Twelve-month follow-up data was analysed for patients from January to June 2020 and revealed treatment continuation rate of 74.4%. Re-fracture rate at the 12-month point was 2.0%.

In addition to 1,225 FLS patients, including 41 patients with hip fractures under the age of 65, 358 patients 65 and older (55 and older for Māori and Pacific Islanders) with a hip fracture were admitted to the orthopaedic ward at North Shore Hospital in 2020. An orthogeriatrician, who works closely with FLS, provided both falls risk assessment and initiation of AOM for these patients. Approximately 75%

of them left the hospital on AOM, and 62% of them were reported to be receiving treatment at 120-day follow-up.¹¹ For the same cohort, falls risk assessment was performed in 95% while inpatient.¹¹

Discussion

Our data illustrate that establishing and implementing an efficient and effective FLS in a New Zealand public healthcare setting is feasible. Over the years, we refined our service delivery model focusing on increased case detection, improved patient evaluation process and improved treatment initiation and adherence rates. Changes we have implemented are largely in accordance with the recent position paper by the IOF CTF working group, National Osteoporosis Foundation and Fragility Fracture Network,¹² and the second edition of Clinical Standards for Fracture Liaison Services in New Zealand.¹³ We have identified and assessed approximately 80% of expected fragility fracture cases in WDHB during the calendar year. Robust treatment initiation/continuation rates of 85.1% and 74.4% at 4 and 12 months, respectively, are also encouraging. On the basis of our work during the period from mid-2019 to mid-2020, we attained Gold Star Rating on the IOF CTF Map-of-Best-Practice.⁸

Compared to our previously published work,⁹ the service has greatly expanded not only in terms of the number of FLS patients identified and intervened on, but also in having more avenues for patient identification. There has been a significant increase in detecting vertebral fracture and community fracture

Table 2: Patient assessment and management.

DEXA scan referred (%)	330 (26.9%)
DEXA scan performed (%)	298 (24.3%)
DEXA scan result (%)	
Osteoporosis	98 (32.9%)
Osteopenia	139 (46.6%)
Normal	61 (20.5%)
Treatment continued, recommended or initiated total (%)	1,174 (95.8%)
Already on treatment, continued	441 (36.0%)
Treatment initiated by FLS	256 (20.9%)
Treatment recommended by FLS for GP to start	477 (38.9%)
Treatment not recommended/ patient declined	51 (4.2%)
Referral (>65) for strength and balance programme (%)	63 (5.1%)

cases. Vertebral fracture patients, akin to hip fracture patients, are known to have very high-risk for future fractures, therefore it was our intention to increase identification of them. We worked with our radiology department and have developed a semi-automated system to identify these patients, as described in the methods above. Identification of fragility fracture patients who never come in contact with WDHB hospitals or clinics has been challenging. We have, at least partially, got around this issue by utilising ACC-generated monthly fracture claims report.

We started conducting 4-month follow-up in late 2019. While this has been resource intensive, we believe that it is a key element of a mature FLS; ensuring administration of AOM where indicated is a core FLS activity. The other important function of the 4-month follow-up is to review DEXA scan results where scans were delayed, and providing treatment recommendations to GPs and patients accordingly. In instances where appropriate AOM was not started or those with delayed DEXA with report recommending AOM, further written communication is sent to the patient and their GP at this 4-month follow-up. More recently, we have started to conduct 12-month follow-up. Intentions of the 12-month follow-up are, again, to ensure treatment adherence in those who are expected to be on treatment, and also to identify re-fracture. AOM adherence has been reported to be poor in the literature.¹⁴⁻¹⁵ Increasing the proportion of patients treated with IV zoledronic acid has helped with our relatively high treatment adherence rate. Ensuring administration of repeat IV zoledronic acid doses at appropriate time intervals remains a challenge.

Our prior fracture rate of 14.8% at the time of patient identification seems lower than anticipated. This is likely due to a number of reasons including relying on patient self-reporting in some cases, and in other cases, available WDBH electronic medical records where some past fragility fractures (e.g., distant past, managed outside of WDHB or in the private sector) would have been missed.

Referral of high-risk cases to a falls prevention programme has been another important addition to our service delivery in recent years. However, we acknowledge that our referral rate is low, and that there is a room for improvement. Some of the reasons for this low referral rate is due to exclusion of those under 65 years of age (no funding for falls prevention programme in this group), as well as all hip fracture cases over 65 years who were managed by the orthogeriatric service with an independent and comprehensive falls prevention pathway. A

number of our patients were already enrolled in a falls prevention programme.

WDHB FLS continued delivering our service through 2020 despite inherent challenges from COVID-19 related disruptions. Our FLS co-ordinators were able to carry on performing their clinical tasks during and after the COVID lockdowns, often working remotely from home and finding alternative ways to do business. Improvisation in certain aspects of our service delivery was inevitable, including utilisation of more phone calls and letter communications instead of face-to-face consultations of patients. This does not seem to have compromised patients' perception of the service we provided; however, a patient satisfaction survey conducted in late 2020, with 79 respondents out of 250 randomly selected FLS patients, showed overwhelmingly positive results with a weighted average of 4.85 out of 5 of patients either "satisfied" or "very satisfied" with the service.

We recognised that accurate and up-to-date record keeping of clinical information gathered on FLS patients is crucial. We have dedicated administration staff who assist with data entry and other administrative duties. We would like to stress the importance of clearly defining the terms entered into the database to ensure accurate, consistent and complete data entry.

There are several key factors that enabled the successful expansion and consolidation of WDHB's FLS. We believe that having dedicated FLS co-ordinators, with regular discussion with clinician(s) with expertise in osteoporosis medicine remains a core element of a successful FLS. Ongoing funding support from the WDHB and ACC was essential in sustaining and expanding the service with recruitment of appropriate FLS personnel. It has been also invaluable to work in close liaison with our orthogeriatrician who cares for the older acute hip fracture patients. Keeping close ties and regular dialogue with orthopaedic, radiology and bone density provider colleagues allowed refinement of our service delivery. Regular monthly service meetings with a supportive service manager have been very helpful in resolving service-level issues. Regular FLS clinical meetings to discuss challenging cases and recent published literature, as well as having opportunities to attend professional development events for the clinical staff enabled us to keep abreast with the latest developments in osteoporosis and secondary fracture prevention. Strategic support and guidance from ONZ have given us a sense of direction in driving service improvement over the years.

There are numerous challenges for FLS locally

at WDHb and nationally. WDHb FLS's biggest challenge has been insufficient FTE to perform all key aspects of FLS work—especially so since implementation of 4- and 12-month follow-ups. Our FLS coordinators often had to go above and beyond allocated hours to complete all tasks. Accurate data capture and entry into database, and well as getting timely DEXA scans have been challenging at times. ACC and ONZ's recent initiatives to fiscally and strategically support FLSs for the next few years will not only help our service address our issues, but also enable other FLSs throughout the country to deliver better secondary fracture prevention. Similarly, a forthcoming

national fragility fracture registry (FFR)¹⁶ will enable individual FLS's performances to be gauged against the Clinical Standards for Fracture Liaison Services in New Zealand.¹³ FFR will identify variations in FLSs throughout the country, and allow respective FLSs to use the data to drive improvement. It will also provide huge opportunities for clinical research.

In conclusion, WDHb FLS has expanded and consolidated over the years to deliver better and broader secondary fracture prevention. Nationwide implementation of effective and efficient FLS will minimise the burden of fragility fractures for our aging population.

COMPETING INTERESTS

Nil.

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