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Evidence-based secondary fracture prevention in Australia:
Proposal for the implementation and evaluation of four demonstration sites

1. Background

1.1 The Burden of Osteoporosis and Osteoporotic Fractures and Refractures

Osteoporosis is a chronic condition characterised by bone fragility and increased fracture risk.[1] The prevalence of osteoporosis increases with age, and so does the incidence of osteoporotic fragility fractures.[1,2] Watts et al.[3] estimate that 160,000 fragility fractures occurred in Australia in 2016, and this number will increase to 180,000 in 2022. The total annual cost of osteoporosis to the Australian economy in 2012 was estimated to be $2.8 billion, including direct costs (hospitalisation, ambulance, imaging, medical services, nursing home, primary care and community services), and indirect costs (informal care, production loss).[3] Direct costs associated with osteoporotic fracture are projected to increase to $3.84bn in 2022.[3]

There is substantial evidence that a fragility fracture at any site indicates a greatly increased risk of further fragility fracture (which we refer to hereafter as secondary fracture). About 80% of secondary fractures occur in the first year following a first fragility fracture.[1,4] The risk of secondary fracture remains elevated for up to 10 years after the first fracture.[5] First fragility fractures are therefore considered sentinel events for osteoporosis and clinicians managing people with a fracture should investigate for osteoporosis, and treat it if it is found and treatment is considered appropriate.[1]

Service models that promote a systematic approach to secondary fracture prevention do so through an organised process of *identification, investigation and intervention*. Effective models typically have dedicated personnel delivering secondary preventive care for people with an assumed fragility fracture.[1,7-9] Thus, a **secondary fracture prevention program** (**SFPP**), often implemented in the form of a hospital-based **fracture liaison service** (**FLS**), is defined as an organised health service activity aimed at preventing further fractures in people who have had a sentinel (i.e. first) fragility fracture.[1, 10, 11]

In the Australian context, there are strong reasons for the integration of primary and secondary health services in the delivery of secondary fracture prevention. They include the large number of people with fragility fracture who do not attend hospital for assessment, and who therefore are missed by hospital-based programs; the important, but often uncoordinated, role primary care currently has in identifying and managing fragility fractures; and, for many people, the inconvenience of physical access to hospital based clinics. [12]

Sanders has estimated that 8,800 fractures could have been prevented and $122 million of direct health-care expenditure saved in 2016 had 80% of people with a sentinel fragility fracture been treated appropriately.[14] Over the period 2016-2022, the total cost avoidable by recognition of these sentinel fragility fractures and diagnosis and management of the underlying osteoporosis amounted to nearly $1bn (detail presented in Annexure A, page 10).

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1.2 Current fracture liaison services in Australia

At the behest of the Australian National SOS Fracture Alliance and with financial support from Amgen, the Sax Institute conducted, in 2018, a survey of the majority (n= 29, 83%) of existing FLSs in Australia.[15] All were hospital-based.

The survey found that most FLSs had only superficial interaction with primary care services, usually by way of sending treatment summaries of FLS attendees to their GPs or their referral to a GP for on-going management. None had integrated operations with local GPs or Primary Health Networks (PHNs). Lack of resources and its impact on priority setting was the reason most often cited for the low level of engagement with primary care.

Almost all (96%) FLSs had a dedicated coordinator and a lead medical specialist, and most (74%) identified patients who may have had an osteoporotic fracture through a combination of passive referral and proactive record searching for relevant patients. Patient referred to the FLS were assessed for bone health and fracture risk by way of a fracture risk analysis, bone density scan and blood panel testing. Results were then usually communicated to the patients' GPs. Two thirds of FLSs initiated treatment and other interventions and then passed the patient's ongoing management to their GP. Most (83%) FLSs followed-up patients after initiating or referring them for treatment.

Timely initiation of clinical management and referral to multidisciplinary services is an essential component of effective care. Optimal models of care include support for routine case finding and systems to monitor patients' progress and encourage coordinated care.[7, 13] Only one third of the surveyed services had an automated system in place to scan electronic medical records, ED records or patient admission systems for key words, terms or codes. Such systems as there were, were of variable, usually low quality. Similarly, a recent study of a small sample of NSW FLSs found that automated electronic systems to support case identification were largely absent. The study recommended that such systems, along with those to support and record patient management and enable reporting on patient and service outcomes, were key elements of an optimal model of care.[12]

Where implemented by an FLS, automated case finding solutions usually searched hospital IT systems for key words, terms or codes, and some included natural language searches of electronic medical records and radiology systems. Whilst none of the surveyed FLSs included private radiology in their case finding activities, significant private imaging throughput and the observation that FLSs rely to varying degrees on private bone densitometry services, provide a valuable opportunity for IT supported surveillance in private radiology practice.

The Sax Institute and the SOS Fracture Alliance have worked together to develop evidence-based models of care for secondary fracture prevention. We now propose demonstrating their feasibility and evaluating their effectiveness and cost-effectiveness in preventing secondary fractures at four Australian locations.

2. Proposal: Implementation of evidence-based models of care

Present evidence clearly shows that more intensive models of service delivery that include active case identification, investigation, treatment initiation and follow-up, and have dedicated service personnel, achieve better outcomes by identifying higher proportions of sentinel fragility fractures and reducing the risk of subsequent fractures through higher treatment initiation rates and better medication adherence.[1, 7] Based on this evidence, we propose here a model for SFPP operation that will be implemented in four demonstration sites. This model:

- *recognises the important role primary care should play in the prevention of secondary osteoporotic fractures;*
- *has a focus on active and timely identification of patients with sentinel fractures;*
- *establishes fully integrated services that will expertly assess patients who may have sentinel fragility fractures, investigate for presence or absence of osteoporosis, initiate osteoporosis treatment and falls prevention as required, monitor clinical progress and ensure continuity of osteoporosis care; and*
- *continuously monitors, evaluates and reports on all aspects of the program's performance.*

2.1 The model

This SFPP model of care is summarised in Figure 1 (see next page). Central to the model's function is a case-worker (SFPP co-ordinator) who uses routinely collected health data and its associated technology to actively identify people with possible sentinel fractures. This identification will be achieved through fully automated electronic searches of private radiology practice reports, public hospital emergency department and admitted patients data collections and hospital and general practice electronic medical records (where implemented and accessible), and agreements between public and private health sectors that enable the SFPP Coordinator to access these records in patients' interests.

Upon identification of a fracture patient, the SFPP co-ordinator reviews the patient's clinical information and evaluates the probability of the identified fracture being a fragility fracture. If this probability is deemed to be high, the SFPP co-ordinator, following an agreed protocol, refers the patient for investigation and management to the associated hospital-based FLS, the patient's GP or to another health professional depending on who ordered the initial imaging.

In summary, the SFPP co-ordinator's initial responsibilities are identification of people who may have a fragility fracture and, if a fragility fracture is probable, facilitating their entry into the healthcare pathway that is best for them. All patient care decisions will lie in the hands of health professionals with whom the patient has an existing link.

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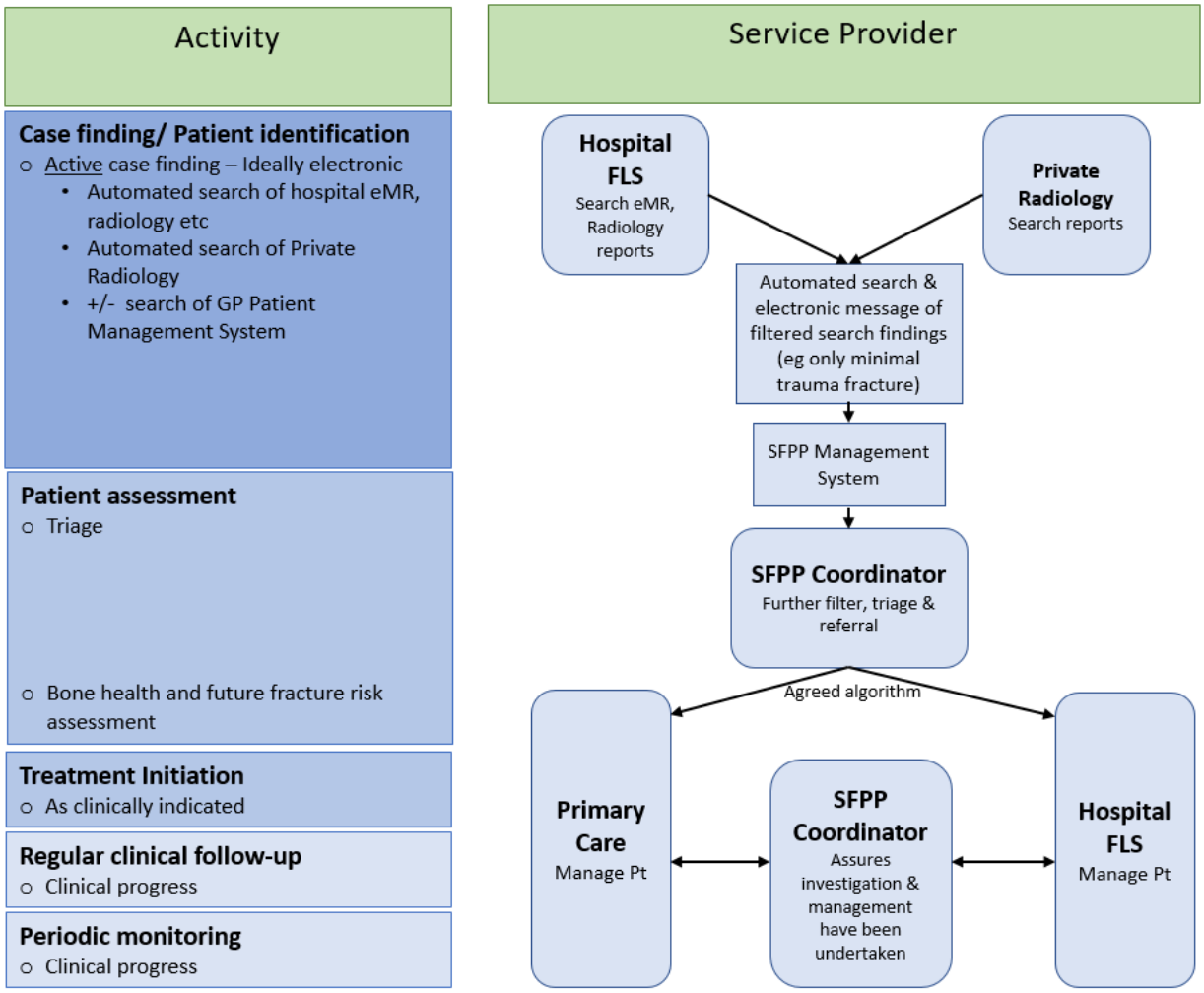
Figure 1: SFPP Demonstration Site Model of Care



In addition to ensuring referral for the care needed, the SFPP co-ordinator follows-up each patient after an agreed interval to determine whether necessary investigation and management steps have been taken. Where a gap in investigation or management is identified, the SFPP co-ordinator reminds the service provider to whom they referred the patient of any outstanding actions; and, at last resort, makes discrete contact with the patient, ascertains the reasons for the gap and, where appropriate, helps the patient close the gap.

This model is agnostic with respect to the SFPP coordinator's location and management reporting line. In many cases they will be in an existing FLS, which is likely to be the initial default option.

It is also worth noting that this SFPP model is very similar in concept to an existing and highly successful Australian health service, the cervical cytology (Pap test) register(s). When these registers were first introduced in the early to mid-1990s as a component of the Australian Cervical Screening Program, arrangements were made for all cervical cytology service providers in Australia, whether public or private, to notify patient-identified cervical cytology

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requests and results to their State-based cervical cytology register (which in some States or Territories sat outside the health service: e.g. in NSW it was in an NGO, Cancer Council NSW). In addition, cytology service providers notified results of subsequent cervical biopsies to the registers. Among other things, the registers operated services to remind women to have their next Pap test if it became overdue and contacted referring doctors and, as necessary, women themselves when lack of a cervical biopsy result suggested that necessary care for possible early cancer had not been given or not been sought. Over the succeeding 10 years, incidence of invasive cervical cancer in Australia fell by 50%.

2.2 Progressing demonstration site implementation and evaluation – Action plan for the SFPP Demonstration and Evaluation Project

The Program Logic for the SFPP Demonstration and Evaluation Project is depicted in Figure 3 (see next page). The medium-term impact of the SFPP Demonstration and Evaluation Project will be a validated model for Australian SFPPs that has the capacity to systematically identify a high (≥80%) proportion of incident sentinel fractures, investigate them and initiate osteoporosis treatment when indicated, together with other management strategies such as falls prevention, exercise and dietary and lifestyle modifications. The sole aim of this model of care is to prevent future fractures. Given the diversity of proposed locations for the Demonstration Sites and the collaborative innovation that will be encouraged in their implementation of the model, their operations and documented performance will guide implementation of SFPPs in Local Health Districts and Primary Health Networks throughout the country.

This section of the proposal describes the design, implementation and evaluation of the SFPP Project's Demonstration Sites. The series of plans and processes required for SFPP Demonstration Site operation are described and, in a later section, costed.

Representatives of four already high-performing FLSs have participated in a recent workshop to discuss the model and what would be needed for them to agree to be Demonstrations Sites for it. The participating FLSs represent four States and one is located in a regional and rural Local Health District.

Stage 1 – Design

The detailed design of the SFPP Demonstration and Evaluation Project will be based on the Sax Institute's research, which, in addition to the national FLS survey, involved and has reported on consultations with experts in primary care and health IT. The results of these consultations[15] will inform project design in these critical areas. Design will be supervised by a Project Over-sight Committee representing SOSFA, the Demonstration Site FLSs and other key stake-holders. This core group will invite experts in critical areas of knowledge (such as primary health care, health IT, program evaluation and health economics to join the Committee). The Sax Institute will be asked to manage the design process.

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Figure 3: SFPP Demonstration Site Program Logic

Aim: Determine feasibility of implementing an Australian Secondary Fracture Prevention Program (SFPP) with capacity to systematically identify, investigate & initiate treatment to prevent future fractures in more than 80% of people with osteoporotic sentinel fracture

Problem Statement	Inputs	Outputs	Short-term impacts	Medium-term impacts	Outcomes
o Osteoporosis is under-identified and under-treated o Under-treatment leads to greater risk of secondary fracture o Osteoporotic fracture causes significant burden of disease and health system costs in people aged over 50 years o Secondary osteoporotic fracture prevention will reduce burden of disease and health system costs	o Small number of stand-alone, hospital based, Osteoporosis Fracture Liaison Services nationally o Network of primary care practitioners o Network of private radiology providers o Health-information technology infrastructure o Funding for existing FLSs o Highly trained staff o Research evidence establishing the value of secondary fracture prevention	o 4 SFPP demonstration sites established in several States o SFPPs comprise primary care and hospital-based Fracture Liaison Services o SFPP demonstration sites implement active case identification via electronic searches of radiology and eMR records in private and public settings. o SFPP co-ordinator identifies ≥80% of people with sentinel fracture within 3 months of fracture o GPs and FLS health pro-fessionals investigate & initiate treatment and falls management to prevent future fractures in people with sentinel fractures • SFPP coordinator continuously monitors patient journey and feeds back on SFPP performance	o Implementation of the model of care by SFPP demonstration sites o Increasing GP involvement in the SFPP demonstration sites o Increasing coordination between SFPP actors o Significant progress on establishing IT-supported case-finding o +/- SFPP Coordinators in place and functioning o Clear evidence of increased sentinel fracture identification	o Validated model for national SFPPs that have the capacity to systematically identify, investigate & initiate treatment & other management to prevent future fractures in people with osteoporosis who experience a sentinel fracture	If SFPPs properly resourced and rolled out nationally: o Optimal identification & management of osteoporosis & secondary fracture prevention o Substantially reduced incidence of secondary fractures

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Stage 2 – Implementation

The Project Oversight Committee, with the addition of a Project Manager, will steer the implementation of the SFPP Demonstration and Evaluation Project. Critical matters to be addressed in project implementation will include: development of protocols and processes, including case inclusion criteria, case identification, clinical management, monitoring and communication protocols; 'change in management strategies' including a primary care integration strategy; and specifications for an SFPP Management System, an IT system to assist with tracking the patients' journeys, alerts and reminders for service providers and data collection to support SFPP performance reporting metrics.

Stage 3 – Evaluation

The Project Oversight Committee will appoint an Evaluation Team led by a health care evaluation expert. The overall performance of SFPP sites will be measured against the following targets:

- identify more than 80% of all patients presenting with sentinel fractures within three months of the fracture with an acceptably low proportion of patients referred for expert assessment who do not have osteoporosis
- maintain effective management and monitoring of clinical progress - such that more than 80% of patients ascertained as having a sentinel fracture have been fully assessed and are receiving necessary care within six months of their fracture

Economic assessment of SFPP Demonstration Sites will include careful costing of all operations with clear distinction between steady state operational costs and costs attributed to implementation of the model and implementation research and evaluation. Cost-effectiveness assessment will be based on these actual costs and overall expenditure savings projected from actual performance achieved in pursuit of the above targets and Australian health service cost data (see Annexure A and reference 14).

Further detail regarding Demonstration Site evaluation is shown **in Annexure B** (page 11).

The **project time** line is detailed in **Annexure C** (page 12).

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3. Funding Required

The estimate of funds required for this project was made on the following assumptions:

1. That present health service and other funding of the four FLSs invited to participate in the SFPP Demonstration and Evaluation Project will continue in real terms for the duration of the Project.
2. That any savings that may accrue to the budgets of these FLSs during the life of the Project and as a result of the Project will not be available to fund any part of the Project.
3. That the Sax Institute will agree to manage the project and will charge for its services in accordance with its present funding policies.

We seek total funding of $5.3 million over three financial years for the SFPP Demonstration and Evaluation Project.

A breakdown of the proposed expenditure budget is given in Table 1. A more detailed account is given in **Annexure D** (page 13).

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Table 1: SFPP Demonstration and Evaluation Project proposed expenditure budget*

Expenditure category	Cost Year 1	Cost Year 2	Cost Year 3	Total Cost
Project Management - Overall	186,000	105,000	93,000	384,000
Project Management - Implementation and Operation at four sites	1,486,800	1,502,100	926,550	3,915,450
SFPP Computer Management System - Specification and purchase	100,000	0	0	100,000
SFPP Computer Management System - Implementation and operation at four sites	460,000	40,000	40,000	540,000
SFPP Evaluation - Overall	69,200	60,000	144,000	273,200
Travel, Printing and Consumables- Overall and at four sites	26,000	26,000	39,000	91,000
Total	**232,8000**	**1,733,100**	**1,242,550**	**5,303,650**

* All cost are AUD excluding GST

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Annexures

Fracture Alliance
Making the first break the last

Annexure A: Number of fractures averted and direct costs saved from appropriate post-fracture care – A modelled analysis performed for the SOS Fracture Alliance by A/Prof Watts, Prof Sanders and Dr Abimanyi-Ochom (July 2017)

The results of this analysis present a guide as to the magnitude of savings and the distribution of fractures averted across population cohorts and by fracture site that might be possible with early identification of fractures and subsequent management of poor bone health with bisphosphonate therapy. The two categories of fractures averted that are likely to have the biggest impact on costs saved are (1) hip fractures, due to the high cost of treatment per patient (ranging from $23,600 to $38,800) and (2) 'Other' fractures, due to their sheer volume.

In this analysis the effectiveness of the service is measured in terms of the number of fractures averted and the cost savings associated with the management of these fractures. The fractures identified are likely to differ by the location of the service, the means of identifying the fracture and the target population group. Similar analyses can be performed for individual states/territory by using the data from the new state burden of disease series by Sanders et al. (2016). The state burden of disease reports provide a calculation of the annual total fractures by age group, sex and bone disease category. These data can be used to model fracture liaison services by state/territory. Outcomes of fractures averted can also be presented as quality adjusted life years saved (QALYs).

Table 1: Extra number of fractures averted and related savings in direct costs when 80% of fracture patients are treated with bisphosphonates compared to 20% of fracture patients are treated with bisphosphonates.

		Number of Fractures Averted (80% bisphos assumption compared to 20% baseline meds)				Total Fractures Averted (80%-20%)	Direct Health Care Cost of Fractures Averted $2016 80% med compared to 20% baseline meds				Total Direct Health Care Costs of Fractures Averted $2016
		Women		Men			Women		Men		
Year	Fracture Type	Age 50-69 yea	Age 70+ years	Age 50-69 yea	Age 70+ years		Age 50-69 years	Age 70+ years	Age 50-69 year	Age 70+ years	
2016	Hip	65	908	58	249	1,280	1,546,489	35,212,440	1,464,321	8,717,243	46,940,494
	Wrist	499	846	67	72	1,483	2,613,110	7,310,552	304,179	411,578	10,639,420
	Vertebral	209	675	89	132	1,105	1,380,426	7,011,646	598,287	996,742	9,987,100
	'Other'	1,562	1,747	1,002	621	4,931	14,599,319	23,409,002	7,147,446	8,765,961	53,921,728
	Total	**2,335**	**4,177**	**1,215**	**1,073**	**8,800**	**20,139,344**	**72,943,640**	**9,514,233**	**18,891,525**	**121,488,742**
2017	Hip	66	938	59	259	1,322	1,570,909	36,355,622	1,484,510	9,072,689	48,483,729
	Wrist	506	874	68	74	1,522	2,653,991	7,548,432	308,341	428,434	10,939,198
	Vertebral	213	697	90	137	1,137	1,402,424	7,238,935	606,729	1,037,270	10,285,359
	'Other'	1,586	1,804	1,015	646	5,052	14,827,720	24,170,698	7,245,236	9,124,944	55,368,597
	Total	**2,372**	**4,312**	**1,232**	**1,117**	**9,033**	**20,455,044**	**75,313,686**	**9,644,815**	**19,663,337**	**125,076,883**
2018	Hip	67	979	59	272	1,378	1,584,436	37,968,120	1,495,843	9,552,885	50,601,284
	Wrist	510	913	68	78	1,570	2,675,361	7,891,552	310,341	451,677	11,328,931
	Vertebral	215	727	91	144	1,177	1,415,313	7,551,703	611,914	1,090,804	10,669,734
	'Other'	1,599	1,886	1,022	681	5,188	14,947,119	25,269,335	7,292,232	9,619,949	57,128,635
	Total	**2,391**	**4,506**	**1,240**	**1,177**	**9,314**	**20,622,230**	**78,680,709**	**9,710,331**	**20,715,315**	**129,728,584**
2019	Hip	68	1,018	60	285	1,430	1,601,497	39,448,065	1,510,086	9,990,944	52,550,592
	Wrist	516	948	69	82	1,615	2,704,655	8,195,077	313,444	472,027	11,685,204
	Vertebral	217	756	92	151	1,216	1,430,229	7,850,793	617,412	1,141,852	11,040,287
	'Other'	1,617	1,959	1,032	712	5,319	15,110,783	26,241,275	7,365,153	10,053,387	58,770,598
	Total	**2,417**	**4,680**	**1,252**	**1,230**	**9,580**	**20,847,164**	**81,735,210**	**9,806,095**	**21,658,210**	**134,046,680**
2020	Hip	69	1,054	61	297	1,480	1,622,475	40,870,195	1,528,400	10,399,587	54,420,657
	Wrist	523	982	70	85	1,660	2,740,573	8,488,380	317,409	491,090	12,037,451
	Vertebral	220	783	93	157	1,253	1,448,711	8,135,619	624,709	1,189,053	11,398,092
	'Other'	1,638	2,029	1,045	741	5,453	15,311,450	27,180,469	7,458,301	10,459,407	60,409,627
	Total	**2,449**	**4,849**	**1,268**	**1,280**	**9,846**	**21,123,209**	**84,674,663**	**9,928,819**	**22,539,136**	**138,265,827**
2021	Hip	70	1,093	61	309	1,532	1,642,992	42,362,098	1,547,370	10,819,698	56,372,159
	Wrist	529	1,018	71	89	1,707	2,775,121	8,798,648	321,355	510,911	12,406,035
	Vertebral	222	812	94	164	1,292	1,467,108	8,432,031	632,497	1,237,075	11,768,711
	'Other'	1,659	2,103	1,058	771	5,590	15,504,471	28,173,968	7,551,040	10,881,558	62,111,038
	Total	**2,480**	**5,026**	**1,284**	**1,332**	**10,121**	**21,389,693**	**87,766,745**	**10,052,263**	**23,449,242**	**142,657,942**
2022	Hip	71	1,131	62	320	1,585	1,668,285	43,858,207	1,570,039	11,233,799	58,330,330
	Wrist	538	1,054	72	92	1,755	2,818,445	9,108,423	326,206	530,348	12,783,421
	Vertebral	226	841	95	170	1,332	1,489,354	8,730,838	641,542	1,284,706	12,146,440
	'Other'	1,685	2,177	1,074	800	5,736	15,746,514	29,165,899	7,665,013	11,295,548	63,872,974
	Total	**2,519**	**5,203**	**1,303**	**1,383**	**10,407**	**21,722,599**	**90,863,366**	**10,202,800**	**24,344,401**	**147,133,165**

Annexure B: SFPP Demonstration Site evaluation

A detailed Program Evaluation Plan will be developed during Stage 1 of the Project. This plan will included data requirements, data collection system and data collection plan. Data to be collected to support economic analysis; assessment of the effectiveness and efficiency of case finding processes; the timeliness and effectiveness of patient assessment, treatment-initiation, ongoing management and periodic monitoring of patients; the effectiveness of liaison with primary care partners; and refracture in patients managed by the SFPP. The whole-of-project Project Management Team will work closely with the sites to develop approaches that optimise data collection processes, with careful minimisation of the burden of collection at each site.

The following information will be acquired:

- sources of case identification
- service providers (FLS or GP) – initial and treating
- patients presenting to the site with any fracture
- patients presenting to the site identified by surveillance as having fragility fracture
- patients presenting to the site thought to have fragility fracture following initial screening
- patients presenting to the site found to have fragility fracture following detailed clinical assessment
- patients found not to have osteoporosis or not need to have osteoporosis therapy after full investigation
- via periodic review or follow-up through linkage with operational records: patients considered not to have a fragility fracture by surveillance and initial screen who are later found to have fragility fracture
- dates of: presentation to the facility with fracture, identification by surveillance as fragility fracture, triage, identification by initial review as fragility fracture, and detailed clinical assessment
- dates of: patient attendance for care and any reminders sent or other follow-up action taken
- dates of: communication between the FLS and the GP (or SFPP co-ordinator and service providers)
- date treatment initiated (where indicated)
- ongoing treatment monitored by service provider
- baseline operating costs (i.e. prior to participation as a demonstration site) for the FLS
- costs associated with demonstration site operation:
  - additional site-specific personnel
  - site-specific SFPP data collection costs
  - site-specific SFPP performance monitoring data collection costs
  - Clear distinction between operating and implementation and evaluation (including between operational and research evaluation) costs
- site-specific IT requirements to support automated case-finding
- other site-specific operating costs (e.g. additional radiology, BMD, blood panel, medications that result from increased case-finding).

Annexure C: Project Time Lines

Year	Year 1				Year 2				Year 3	
Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Stage 1 – Design										
Project Management Team assembled										
Project Governance structures assembled										
Protocols & processes developed										
Evaluation Plan developed & data items specified										
Site-specific Project Management Team assembled										
Site-specific plans & strategies developed										
Stage 2 – Implementation										
Participant sites implement agreed protocols, processes & strategies										
SFPP data collection & transmission										
Progress case id through health IT systems										
Periodic data analysis & reporting										
Stage 3 - Evaluation & project wrap-up										
Quantitative analysis										
Qualitative analysis										
Economic analysis										
Report & recommendations										
Dissemination of findings										

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Annexure D: Detailed model costing

ID	Item	Resource required	Quantity of Resource Year 1	Quantity of Resource Year 2	Quantity of Resource Year 3	Unit Price	Cost Yr 1 $ (GST excl)	Cost Yr 2 $ (GST excl)	Cost Yr 3 $ (GST excl)	Total $ (GST excl)	Notes
Whole of project											
1	Whole-of-project Project Manager	Project Manager S&W	1.0 FTE	0.5 FTE	0.5 FTE	$120000 pa	120000	60000	60000	240000	
		On-cost				35%	42000	21000	21000	84000	
2	Whole-of-project Project Steering Committee	Nil specific	.	.	.	.	.	.	.	0	
3	Whole-of-project Stakeholder, Partner & Expert Panel (Advisory Group)	Session fee & travel	3 members x 4 meetings	3 members x 4 meetings	3 members x 2 meetings	$2,000	24000	24000	12000	60000	assumes at most 3 members of the Panel will require reimbursement
4	SFPP Management System - data base development to support SFPP function & evaluation data collection	Database developer/ Commercial Off The Shelf product & customisation & licence	.	.	.	.	100000	.	.	100000	assumes COTS with $50000 initial cost + $50,000 customisation & licence cost
5	Automated case-finding tool hospital IT (eMR) - **development**	Nil specific	.	.	.	.	.	.	.	0	assumes implementation of NSW ACI case-finding tool
6	Periodic analysis and reporting to Project Steering Committee and site-specific Project Management Teams Final SFPP evaluation - **Data analysis**	Data Analyst	0.1 FTE	0.2 FTE	0.25 FTE	$150 ph	30000	60000	75000	165000	assumes analyst will also undertake some benchmarking feedback analysis for participating GP practices
7	SFPP evaluation - **Economic analysis**	Health economist	40 hrs	.	80 hrs	$250 ph	10000	.	20000	30000	
8	SFPP evaluation - **Qualitative analysis**	Qualitative evaluator	128 hrs	.	160 hrs	$150 ph	19200	.	24000	43200	Includes analysis
9	SFPP evaluation - **Evaluation advice**	Evaluator	40 hrs	.	80 hrs	$250 ph	10000	.	20000	30000	
10	SFPP evaluation - **Report**	Project Managers, Project Coords	.	.	.	.	.	.	.	0	
11	SFPP evaluation - **communication of findings & recommendations**	Comms collateral	.	..	.	.	.	.	5000	5000	
12	Consumables	Consumables	.	.	.	.	5000	5000	5000	15000	
13	Travel	Travel	.	.	.	.	5000	5000	5000	15000	
14	Printing	Printing	.	.	.	.	.	.	5000	5000	
	Sub-total						365200	175000	252000	792200	

Site-specific (per site)											
15	Site-specific Project Management Team - FLS Lead Clinician	Backfill	0.2 FTE	0.1 FTE	0.05 FTE	$225000 pa	45000	22500	11250	78750	applies Senior Staff Specialist classification - Staff Specialists (State) Award 2018
16	Site-specific Project Management Team - FLS Coord	Nil specific	.	.	.	.	.	.	.	0	assumes no additional resource for this role
17	Site-specific Project Coordinator	Project Coordinator S&W	1.0 FTE	0.5 FTE	0.25 FTE	$105000 pa	105000	52500	26250	183750	assumes GP education/ academic detailing will be undertaken by the Project Coord and the SFPP Coord
		On-cost	.	.	.	35%	36750	18375	9187.5	64312.5	
18	Site-specific SFPP Coordinator	SFPP Coordinator S&W	1.0 FTE	1.5 FTE	1.0 FTE	$130000 pa	130000	195000	130000	455000	assumes SFPP Coord role and Demonstration Project Site Coord role cannot be satisfied by 1 person assumes increasing resource requirement in yr 2&3 to manage increasing case load as case-finding improves applies Nurse/ Midwife
		On-cost	.	.	.	35%	45500	68250	45500	159250	
19	Site-specific Administration Assistant	SFPP Admin S&W	0.1 FTE	0.2 FTE	0.1 FTE	$70000 pa	7000	14000	7000	28000	applies Administration Officer - Level 6 classification - HEALTH EMPLOYEES ADMINISTRATIVE STAFF (STATE) AWARD 2018
		On-cost	.	.	.	35%	2450	4900	2450	9800	
20	Site-specific develop protocols and processes	Lead Clinician, Site-specific Project Coordinator	.	.	.	.	.	.	.	0	
21	Site-specific implementation automated case-finding tool hospital IT (eMR) - **licence**	Licence	1 licence	1 licence	1 licence	$10,000	10000	10000	10000	30000	assumes implementation of NSW ACI case-finding tool
22	Site-specific implementation automated case-finding tool hospital IT (eMR) - **hardware**	Server	1 server	.	.	$5,000	5000	.	.	5000	

23	Site-specific implementation automated case-finding tool hospital IT (eMR) - **local implementation & hosting costs**	Hospital IT effort	$50,000	.	.	50000	50000	.	.	50000	assumes site-specific customisation of natural language processing is required
24	Site-specific implementation SFPP Management System - **local implementation & hosting costs**	Hospital IT effort	$10,000	.	.	10000	10000	.	.	10000	
25	Site-specific automated case-finding tool private radiology	Private radiology IT effort 4 radiology providers @ $10K each	$40,000	.	.	.	40000	.	.	40000	assumes 4 radiology providers @ $10K each
26	Consumables	Consumables	.	.	.	.	2000	2000	2000	6000	
27	Travel	Travel	.	.	.	.	2000	2000	2000	6000	
28	Printing	Printing	.	.	.	.	.	.	2000	2000	
	Sub-total						**490700**	**389525**	**247638**	**1127863**	**
	Total (whole of project + 1 site)						**$855,900**	**$564,525**	**$499,638**	**$1,920,063**	**assumes 1 SFPP site**
	Grand Total (whole of project + 4 sites)						**$2,328,000**	**$1,733,100**	**$1,242,550**	**$5,303,650**	**assumes 4 SFPP sites**

** Note, the site specific costs, particularly those additional resources needed to manage increased case load (see ID18), will vary by site & catchment population. It is anticipated that, within the entire Program's budget, some re-distribution of the site-specific budget will be made based on catchment population

Annexure E. About the SOS Alliance

The Australian National Fracture Alliance ('SOS Fracture Alliance') was formed in late 2016 (www.sosfracturealliance.org.au). Its aim is to 'make the first break the last' by improving the care of patients presenting to the health system for diagnosis or care of a sentinel fracture. The Alliance currently has 34 member organisations (www.sosfracturealliance.org.au/alliance-members), including all relevant health professional and community organisations, which collectively have more than 3 million individual members.

Alliance activities

Program development project
The Alliance has initiated a program development project, which is being conducted by the Sax Institute (www.saxinstitute.org.au). This project has determined the feasibility of designing, evaluating and translating into practice an Australian secondary osteoporotic fracture prevention program (SFPP) that has the:

- *capacity to systematically identify, investigate and initiate management to prevent future fractures in people with osteoporosis who experience a sentinel fracture, and*
- *potential to engage quickly with more than 80% of all such people.*

While there are some thirty Fracture Liaison Services operating in Australia, none ascertains and intervenes on a high proportion of sentinel fractures occurring in the population it serves. This is mainly because these programs depend on patients presenting to hospitals for the diagnosis and care of their sentinel fractures. This approach probably ascertains about half of the sentinel fractures occurring in the served populations, missing particularly spinal and wrist fractures, which are either not recognised clinically (although featuring in x-ray reports) or not diagnosed or cared for in a hospital.

Moreover, if secondary fracture prevention programs were to ascertain 80% or more of sentinel fractures, the specialist workforce that now investigates and initiates preventive care for patients with sentinel fractures would be unable to manage the load. Thus it is likely that substantial engagement of general practitioners will be required if these programs are to successfully address the need.

The *Program development project has:*

1. Surveyed in detail the majority of current Fracture Liaison services in Australia and, from the information obtained, determined the currently most effective and efficient model of secondary fracture prevention program design and operation in Australia.
2. Analysed by way of the above survey and direct contact with primary healthcare experts and Australian Primary Health Networks (local organisations that support and coordinate the efforts of general practitioners) what contribution general practitioners and other primary health care workers currently make to secondary fracture prevention programs.
3. Examined whether or not existing healthcare IT systems are able to provide timely and inexpensive identification of sentinel fractures and notify them to a relevant secondary fracture prevention program so that the affected patients could be offered its services.
4. Identified Fracture Liaison Services that could be developed as best-practice models of secondary fracture prevention in Australia and their performance assessed.

Subject to achieving the desired performance in step 4 above, funding will be sought for these model programs to be rolled out nationally.

Primary health care engagement projects

While the *Program development project* has been in progress, a number of smaller projects have been carried out to facilitate engagement of primary healthcare in secondary fracture prevention. For example, a collaborative project between Sydney's Central Local Health District and the Sydney Central and Eastern Primary Health Network has been initiated to study the feasibility of using electronic records of hospital and private radiology services to enable early identification of patients with vertebral fractures and their referral to a secondary fracture prevention service directly or by way of their GP.

Dialogue with Government

The SOS Fracture Alliance has initiated dialogue with officers of the Australian Department of Health's Population Health and Sport Division and Primary Health Network Branch (Health Services Division). These officers are very encouraging of the projects described above and would support referral of a nationwide best-practice plan for secondary fracture prevention to the Australian Health Ministers Advisory Council and the COAG Health Council for consideration of implementation nationwide.

Discussions have also been had with the NSW Chief Health Officer and the Acting CE of the NSW Agency for Clinical Innovation, which is the NSW Health agency responsible for recommending innovations, such as a redesigned secondary fracture prevention program, to the NSW Government. Ultimately the support of all State and Territory Governments will be needed if an integrated (across primary, secondary and tertiary health care), well-functioning secondary fracture program is to be implemented nationwide.

Benefits of an Australian National Secondary Fracture Prevention Program

All evidence available on the performance of programs of the kind the Alliance is developing suggests that it is likely to be highly cost-effective, especially if it makes optimal use of routinely collected health data and the associated IT systems to identify people with sentinel fractures and to coordinate their preventive care. A 2011 study based on the secondary fracture prevention program at Concord Hospital, Sydney, estimated the cost of the Hospital's program to be $17,291 per quality-adjusted life year saved. A more recent study based on the John Hunter Hospital, Newcastle, FLS estimated that the program's *annual* throughput of new patients with sentinel fractures *saved* Australian health services $1 million to $1.75 million.