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Original Article

Dropping the Ball and Falling Off the Care Wagon. Factors Correlating With Nonadherence to Secondary Fracture Prevention Programs

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Abstract

Health care systems and hospitals in several countries have implemented Fracture Liaison Services (FLSs). Success rates of FLSs with regard to osteoporosis assessment and treatment, fracture reduction, and adherence to osteoporosis medications have been reported by several groups including ours. A significant drop-out rate among patients in these programs may occur. This has not been evaluated before. We explored the factors correlating with nonadherence among a multiethnic population of patients in the FLS at our institution, the largest tertiary teaching hospital in South East Asia. Our secondary objective was to explore whether patients who defaulted follow-up visits continued to be compliant with medications.A retrospective analysis of our FLS's computerized database was performed. Of 938 patients followed up more than 2 years, 237 defaulted at various time points. A significant percentage of patients who dropped out of the program opined that it was because the follow-up visits were too time consuming. Non-Chinese patients were more likely than Chinese (adjusted hazard ratio [aHR] = 1.98, 1.33−2.94), patients with primary school education and below were more likely than those with secondary school and above education (aHR = 1.65, 1.11−2.45) and those with nonvertebral and/or multiple fractures were more likely than those with spine fractures (aHR = 1.38, 1.06−1.81) to be nonadherent. A fraction of patients who defaulted continued to fill osteoporosis medication prescriptions. Median medication possession ratio among the patients who defaulted was 12.3% (interquartile range: 4.1%−36.7%) at 2 years. Persistence ranged from 15.1% to 20.8% and from 1.9% to 7.5% at 1 and 2 years, respectively after defaulting from the program.Our study, which to the best of our knowledge is the first of its kind, provides insight into the factors correlating with nonadherence to FLSs. Knowledge of the challenges faced by patients may be of help to health care providers interested in developing FLSs.

Key Words: Adherence; Fracture Liaison Service; fragility fracture; health service research; secondary fracture prevention.

Introduction

Bone fragility, falls, and fractures form a continuous trajectory in osteoporosis and multiple points exist along this precipitous path where interventions can be made. Fracture Liaison Services (FLSs) have been set up in several centers worldwide. Several groups have reported on their operational characteristics *(1,2)* and reports of differing osteoporosis treatment and refracture incidence rates of these FLSs exist *(3)*. Compliance to osteoporosis medications in care-coordinator driven programs has also been reported *(4)*. Whether these current models of secondary fracture care are meeting the needs of patients and why patients are not

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entirely compliant to the essential follow-up visits needed in these programs have not been explored previously. Implementing an FLS is only half the battle. It is critical while running such services to look back and evaluate why patients could have ''fallen off the care wagon'' and, as providers of health care how we could have missed this and ''dropped the ball'' of managing these patients effectively.

Osteoporosis Patient Targeted and Integrated Management for Active Living (OPTIMAL) is a Ministry of Health funded multicomponent FLS instituted in 2008 in the public hospitals and polyclinics of Singapore; a country with a multiethnic population of Chinese, Malays, and Indians. Enhanced osteoporosis assessment, treatment rates, and compliance to medications among patients recruited and followed up through the program at Singapore General Hospital, the largest public hospital in the region, and the system level barriers that we encountered while implementing the program have been published previously *(1,2)*. This study aims to provide an enumeration of patients who defaulted the program during a 2-year follow-up period and to objectively analyze the factors correlating with this nonadherence. Since the possibility existed that some of the patients who dropped out of follow-up visits could still be getting prescriptions for antiosteoporosis medications filled from other doctors who they visited for unrelated causes, we also examined our computerized prescription and pharmacy records to evaluate the continued adherence or lack thereof to osteoporosis medications among these patients.

Methods and Statistical Analysis

The operational features, inclusion criteria, and workflow of OPTIMAL are shown in Figs. 1–3. Each patient's demographic details, date of screening and enrollment into the program, risk factor assessment, past medical and surgical data including fractures and falls history, current medication use, dietary calcium intake, and dual-energy X-ray absorptiometry (DXA) results are recorded into a centralized computerized recorded database (CCRD). Data are entered into the CCRD in a continuous fashion. Information about falls or fractures that have occurred in the intervening period and DXA results done at the end of 2 years is also recorded. Patients who do not come back for follow-up visits are contacted via phone and the reason(s) why they do not wish to remain in the program are also recorded. The CCRD of patients recruited at Singapore General Hospital was

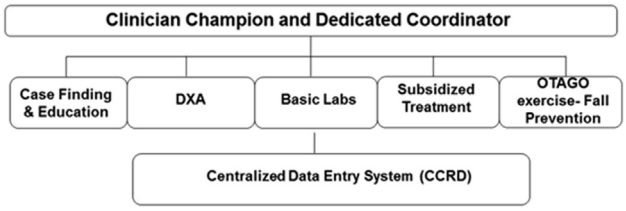

Fig. 1. OPTIMAL program.

Male or Female > 50 years old
Patient with previous (new or old) vertebral or non-vertebral fragility fracture (except skull/facial fracture and fracture below ankle or distal to wrist) that occurred after the age of 50 years old
Patients seen in both inpatient and outpatient settings as well as seen in emergency room and subsequently discharged
Agree to participate in the program

Fig. 2. Inclusion criteria for OPTIMAL. OPTIMAL, Osteoporosis Patient Targeted and Integrated Management for Active Living.

retrospectively reviewed for this study. Patients who were recruited from 2008 to 2012 were analyzed. This was so that information over at least a full 2-year period of follow-up would be available. Approval to conduct this study was obtained from the Institutional Review Board of our hospital.

The primary outcome of the study was to identify patient-reported factors independently associated with noncompliance to the program. A subanalysis of continued adherence to osteoporosis medications in patients even after they defaulted follow-up visits was also conducted. Adherence to antiosteoporosis medication was measured using the hospital's Electronic Health Intelligence System, a unique and comprehensive data warehouse into which the physician order entry system (SCM; Eclipsys, Atlanta, USA) and pharmacy dispensing system (MaxCare; iSOFT, Adelaide, South Australia) feed data, and it is possible to extract all electronic prescriptions and pharmacy refill records. Each patient's adherence to osteoporotic medications was evaluated up to 2 years after defaulting follow-up. Medication adherence was estimated using 2 measures; compliance and persistence *(5)*. Compliance as a continuous variable was estimated using the medication possession ratio (MPR), calculated using the following formula:

$$\text{MPR} = \frac{\text{Duration of pharmacy refills}}{\text{Duration of follow} - \text{up}}$$

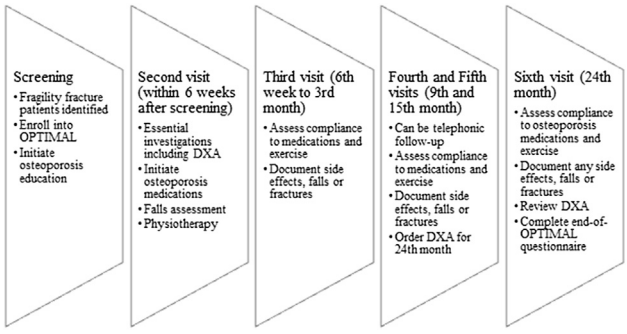

Fig. 3. Workflow of OPTIMAL showing follow-up visits. DXA, dual-energy X-ray absorptiometry; OPTIMAL, Osteoporosis Patient Targeted and Integrated Management for Active Living.