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Service availability and readiness for hip fracture care in low- and middle-income countries in South and Southeast Asia

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Aims

The aim of this study was to describe the current pathways of care for patients with a fracture of the hip in five low- and middle-income countries (LMIC) in South Asia (Nepal and Sri Lanka) and Southeast Asia (Malaysia, Thailand, and the Philippines).

Methods

The World Health Organization Service Availability and Readiness Assessment tool was used to collect data on the care of hip fractures in Malaysia, Thailand, the Philippines, Sri Lanka, and Nepal. Respondents were asked to provide details about the current pathway of care for patients with hip fracture, including pre-hospital transport, time to admission, time to surgery, and time to weightbearing, along with healthcare professionals involved at different stages of care, information on discharge, and patient follow-up.

Results

Responses were received from 98 representative hospitals across the five countries. Most hospitals were publicly funded. There was consistency in clinical pathways of care within country, but considerable variation between countries. Patients mostly travel to hospital via ambulance (both publicly- and privately-funded) or private transport, with only half arriving at hospital within 12 hours of their injury. Access to surgery was variable and time to surgery ranged between one day and more than five days. The majority of hospitals mobilized patients on the first or second day after surgery, but there was notable variation in postoperative weightbearing protocols. Senior medical input was variable and specialist orthogeriatric expertise was unavailable in most hospitals.

Conclusion

This study provides the first step in mapping care pathways for patients with hip fracture in LMIC in South Asia. The previous lack of data in these countries hampers efforts to identify quality standards (key performance indicators) that are relevant to each different healthcare system.

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Introduction

Patients with a fragility hip fracture have a one-year mortality of 20%, with survivors having a permanent reduction in health-related quality of life similar to that of a patient after a stroke.¹ This places a great strain on both patients and their carers, as well as the health and social care systems looking after them.

The number of patients with fragility fractures is increasing dramatically in low- and

middle-income countries (LMIC), as more people live into older age. South and Southeast Asia is one of the areas most affected by these demographic changes. A recent study in nine countries in Asia predicts that the number of osteoporotic hip fractures alone will increase from just over one million now to just over 2.5 million in 2050.² The associated financial burden will increase from US\$9.5 to US\$15 billion.³ These figures do not include the cost of the social care needs

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Table I. Summary of respondents by country.

Country	Completed responses, n	Ratio of hospital respondent funding source, public:private:both, n (%)	Ratio of general hospital: specialist/university hospital, n (%)	Hospital representative of hip fracture care in all hospitals, yes:no, n (%)	OECD country definition ¹⁸
Malaysia	26	8 (31):16 (61): 2 (8)	10 (38):16 (42)	15 (58):11 (42)	Upper middle income
Nepal	10	6 (60):1 (10): 3 (30)	6 (60): 4 (40)	4 (10):6 (60)	Least developed
Philippines	24	16 (67): 8 (33): 0 (0)	15 (63): 9 (37)	13 (54):11 (46)	Lower middle income
Sri Lanka	7	7 (100): 0 (0): 0 (0)	3 (43): 4 (57)	7 (100): 0 (0)	Lower middle income
Thailand	31	24 (78): 2 (6): 5 (16)	8 (26): 23 (74)	24 (77): 7 (23)	Upper middle income

Table II. Basic service availability data by country.

Country	Population size, million (yr of census)	Proportion of population aged over 50 years, %	Hospital facilities, n
Malaysia	33m (2022) ¹⁹	20 ¹⁹	375 ²⁰
Nepal	29m (2021) ²¹	17 ²²	125 ²³
Philippines	109m (2020) ²⁴	17 ²³	849 ²⁵
Sri Lanka	20m (2011) ²⁶	24 ²⁶	1,103 ²⁷
Thailand	66m (2021) ²⁸	33 ²⁸	1,344 ²⁹

of those suffering with disabilities; in particular, the quarter of patients requiring long-term nursing care.^{4,5} This will place a potentially unsustainable burden on the healthcare economies of LMIC.

In the UK and other high-income countries, it has been demonstrated that detailed descriptions (mapping) of fragility fracture care pathways within a healthcare system is possible through hip fracture registries.^{6,7} The subsequent identification and reporting of key performance indicators (quality standards), which focus attention upon specific aspects of patient care, can reduce mortality and improve quality of life for patients, while at the same time reducing hospital bed days and associated healthcare costs; for example, by reducing time to surgery and by timely access to physiotherapy.⁸⁻¹⁰ However, care pathways for fragility fracture patients in many LMIC are poorly defined or not defined at all.¹¹ This makes it impossible to identify appropriate performance indicators, and to set bespoke quality standards to drive improved outcomes in the most cost-effective way.

In this study, we describe in detail the healthcare resources currently available in LMIC in South Asia and how patients access these resources.

Methods

We used the World Health Organization Service Availability and Readiness Assessment (SARA) tool as the theoretical framework for this study.^{12,13} SARA was designed to “assess and monitor the service availability and readiness of the health sector and to generate evidence to support the planning and managing of a health system”. SARA methodology uses systematic data collection to generate tracer indicators of service availability and readiness.

We combined existing datasets (United Nations Population Prospects and Economic Intelligence Unit data) with structured, online surveys of the national Fragility Fracture Networks (FFNs) in Philippines, Malaysia, Sri Lanka, Nepal, and Thailand (chosen due to existing relationships among the collaborators). The FFN in each country is a multidisciplinary group of activists representing all of the professions involved in hip fracture care and has been actively engaged with policy makers in each country.¹⁴

For the purposes of this study, the healthcare professionals and managers completing this survey were advised that all patients aged 50 years or over were considered to have sustained a fragility fracture if they broke their hip. Surveys were designed iteratively, through feedback from members of each national FFN and with substantial input from representatives of patients and the public through the World Musculoskeletal Trauma PPI Group with community engagement and involvement representatives from each country. The study was overseen by an international study advisory group, assembled for its clinical expertise, practical experience of collecting quality data in LMICs and academic knowledge in clinical/economic modelling in health service research.

No patient identifiable data were collected during the study. As a description of hip fracture care pathways, the study did not require research ethics approval under section 2.3.14 of the UK NHS governance arrangements for research ethics committees.¹⁵

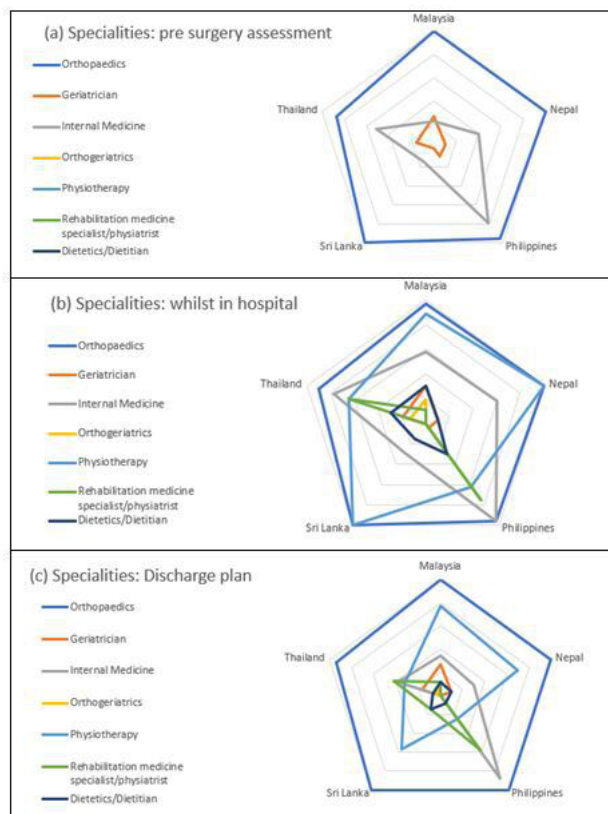
The data for this study were collected from healthcare professionals and managers via a URL sent to members of the national FFN in each country between April 2020 and November 2020, using the REDCap data collection tool,^{16,17} with the survey split into multiple sections covering respondent information, pre-hospital care pathways, in-hospital care pathways, discharge information, post-discharge care pathways, and health and social care policies.

Statistical analysis. Standard descriptive statistics were used to describe the demographics, reporting means and standard deviations or medians and interquartile ranges as appropriate for continuous variables, and numbers and percentages for binary and categorical variables. Data were analyzed under three headings:

Table III. Timing of events in the care pathway per country based on number of responding hospitals.

Country	Median time to hospital, hrs (IQR)	Median time to ward, hrs (IQR)	Median time from admission to surgery, days (IQR)	Median length of acute hospital stay, days (IQR)
Malaysia	9.8 (5.6 to 31.5)	3.9 (2.2 to 6.7)	2.5 (1.7 to 3.6)	5.7 (3.9 to 6.5)
Nepal	30.0 (11.0 to 33.0)	4.3 (2.7 to 9.5)	6.7 (2.7 to 10.8)	6.0 (5.3 to 9.6)
Philippines	32.0 (18.0 to 90.0)	6.0 (3.2 to 14.4)	6.4 (3.7 to 10.7)	8.0 (6.0 to 10.5)
Sri Lanka	4.2 (2.1 to 7.5)	0.9 (0.4 to 2.7)	8.0 (4.5 to 11.5)	8.2 (4.3 to 12.25)
Thailand	6.6 (3.2 to 11.1)	3.4 (2.0 to 4.76)	3.4 (2.3 to 4.3)	6.9 (5.6 to 7.7)

IQR, interquartile range.

**Fig. 1**

Percentage of hospitals reporting specialties involved in hip-fracture care. a) pre-surgery assessment; b) while in hospital; c) discharge plan. All axes are in 20% increments where the denominator is the number of hospitals reporting (Table I).

1. Service availability: the number of facilities and beds per head of population, the healthcare workforce, and those facilities specifically available for inpatient and community/social care, in each LMIC.
2. Service readiness: the basic amenities, equipment, diagnostic services, and medicines/implants available at a facility level in each LMIC.
3. Service-specific readiness: the service readiness in each LMIC for the care of patients fragility hip fracture specifically.

Results

A total of 98 complete responses were received. Table I lists the countries, number of responses and developmental status as defined by the Organization for Economic Cooperation and Development (OECD).¹⁸ Table II describes the basic service availability data by country.

A mix of specialist/university and general hospitals provided data, with most hospitals being publicly funded and deemed representative of hip fracture care in their country. (Table I). The cost of interventions (e.g. surgical implants) was predominantly paid for by the individual, except in Sri Lanka and Thailand, where all nearly all treatment was reported as being state funded. Population and hospital facility data are provided for each participating country in Table II.

Following a hip injury, clinicians reported that patients travel to hospital via ambulance (both publicly- and privately-funded) or private transport. The median time between injury and arriving in hospital being less than 12 hours, with the exception of Nepal and the Philippines where the median time to hospital is more than a day (Table III). All hospitals used plain radiographs as the first-line investigation, with CT or MR scans routinely available, if required (Malaysia (n = 19; 73%); Nepal (n = 8; 89%); Philippines (n = 22; 92%); Sri Lanka (n = 7; 100%); and Thailand (n = 22; 76%).

The majority of patients were admitted to a specialist hospital ward under the care of the orthopaedic surgery team within 12 hours of arrival in hospital (Table III). Ward-based assessments were routinely performed by a broader multidisciplinary team, but not necessarily before surgery was considered (Figure 1).

Most patients received surgery for their hip fracture, but the median percentage varied by country, and by hospital within country: Malaysia 90.0% (interquartile range (IQR) 77.8% to 95.4%); Nepal 90.0% (IQR 80.6% to 96.9%); the Philippines 78.0% (IQR 59.4% to 92.5%); Sri Lanka 95.6% (IQR 71.9% to 97.8); and Thailand 92.1% (IQR 78.1% to 96.7%). However, the median time to surgery varied dramatically between countries, ranging from 2.5 days to 8.0 days (Table III).

Spinal anaesthetic was preferred to general anaesthetic in most hospitals. The preferred surgical options for

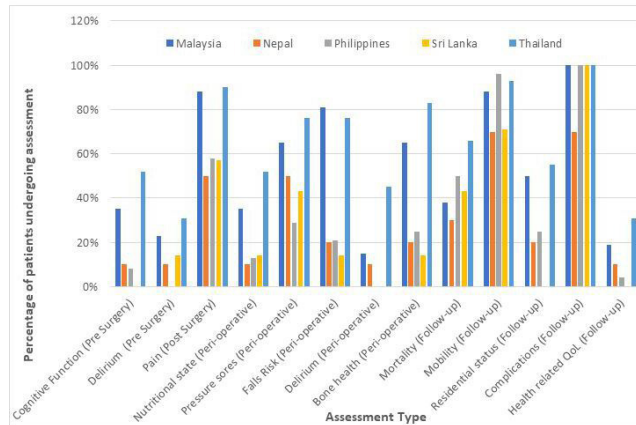


Fig. 2

Percentage (to nearest %) of responding hospitals undertaking pre-, post-, and perioperative patient assessments.

undisplaced and displaced intracapsular fractures were screw fixation and cemented arthroplasty, respectively. Cephalomedullary nail fixation was the most common surgical option for extracapsular and subtrochanteric fractures.

The specific assessments made while patients were in hospital are shown in Figure 2, together with follow-up arrangements and outcome data collection. Perioperative assessments were variable. Pain scores were routinely recorded in most hospitals, but cognitive assessments (dementia or delirium) were rarely recorded. Falls and bone health assessments were rarely made outside of Malaysia and Thailand.

The majority of hospitals provided a mobility assessment on the first or second day after surgery, but there was notable variation in postoperative weightbearing protocols between hospitals in all countries. Postoperative complications were routinely recorded in most hospitals in all countries, but other outcomes were less commonly assessed and only a minority of hospitals systematically recorded mortality data. The average length of stay was less than 14 days in most hospitals. However, substantial variations in the model of care were observed, with a third of hospitals lacking a formal service agreement. Furthermore, community support services and/or access to community beds were rarely available in any country.

Of note, most hospitals, in all countries, routinely offered patients follow-up appointments in the first six weeks after discharge. (Table IV) However, subsequent follow-up was much more variable.

Discussion

This study demonstrates that service availability and readiness to manage fragility fracture of the hip varies widely between LMIC in South Asia. Before this study, there are some data on general service readiness (WHO and Economic Intelligence Unit), and some data on secondary

Table IV. Number of responding hospitals following up patients at four to six weeks, three to four months, six months, one year, and > one year (more than one option could be selected).

Country	Hospitals reporting follow-up, n				
	4 to 6 weeks	3 to 4 months	6 months	1 year	> 1 year
Malaysia (n = 26)	18	6	5	8	3
Nepal (n = 10)	9	5	3	5	3
Philippines (n = 24)	19	6	8	8	4
Sri Lanka (n = 7)	4	1	1	3	2
Thailand (n = 31)	21	6	6	12	7

fracture prevention (International Osteoporosis Foundation).² However, there was little or no data available on acute fragility fracture care pathways in the Philippines, Nepal, Sri Lanka, Malaysia, and Thailand.

In high-income countries, published evidence has demonstrated that service availability and readiness data can be used to generate quality standards that reduce mortality and improve quality of life.⁸⁻¹⁰ However, care pathways, and hence appropriate indicators may be very different in LMIC. For example, in developed health-care economies, emphasis is placed on reducing delays between hospital arrival and surgery with most patients arriving in hospital by ambulance within a few hours of their injury. By contrast, data from the Philippines shows that the main delay to treatment occurs before arrival at hospital. Furthermore, while it has been shown in the UK and elsewhere that patient outcomes are improved if patients are under joint orthogeriatric care, geriatric medicine does not exist as a standalone speciality in many countries and so alternative sources of expert medical input will need to be identified.

The strength of this study comes from the engagement of expert healthcare professionals in representative institutions in each LMIC. There are, however, several limitations. First, although sites were chosen to be representative of the predominant model of health-care provision in each country (e.g. publicly-funded or health insurance-based), respondents were generally from larger institutions treating higher numbers of patients with fragility hip fracture and responses may not be representative of care pathways in smaller institutions. Furthermore, respondents were members of or affiliated with the national FFN in each country. Their responses may not represent the experience of healthcare workers in other institutions which do not have as close links with the national multidisciplinary care network. Second, the data presented represents the experience and knowledge of healthcare professionals and managers in each

LMIC, and this may not represent the lived experience of patients themselves, or their carers.

Nonetheless, these data provide a baseline assessment of the current care pathways provided for patients with a fracture of the hip in each country. As care pathways alter and develop, service availability and readiness assessments can be used to track changes from this baseline. Future work is required to determine whether or not changes in pathways of care improve patient outcomes, with an emphasis on patient-reported health-related quality of life. Recent research funding awards should provide the resource required to test changes in patient pathways of care in terms of patient-centred outcomes.³⁰

In conclusion, this study provides the first step in mapping care pathways for patients with hip fracture in five LMIC in South Asia. The previous lack of data in these countries hampers efforts to identify quality standards (key performance indicators) that are relevant to each different healthcare system. Only by identifying relevant quality standards can the effects of change in care pathways be evaluated. By understanding current service availability and readiness, we can begin to identify quality standards that are bespoke to each healthcare system, and that may be used to drive improvements in patient care in each country.



Take home message

- This study is the first step in mapping service availability and readiness for hip fracture care in low and middle income countries in South and South East Asia.

- Future work should investigate quality standards appropriate for the different healthcare economies.

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- D. Appelbe: Methodology, Conceptualization, Data curation, Writing – review & editing.
- N. Parsons: Methodology, Conceptualization, Writing – review & editing.
- S. Lekamwasam: Data curation, Writing – review & editing.
- T. Amphansap: Data curation, Writing – review & editing.
- D. Pandey: Data curation, Writing – review & editing.
- M. Costa: Methodology, Conceptualization, Writing - original draft.

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