DOI: 10.58490/ctump.2025i10TA.4384

CURRENT STATUS OF ORTHOPEDIC SERVICES IN THE MEKONG DELTA REGION OF VIETNAM – A MULTICENTER STUDY

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Received: 08/11/2025

Reviewed: 14/12/2025

Accepted: 25/12/2025

ABSTRACT

Background: *Orthopedic and trauma care plays a critical role in maintaining musculoskeletal health. In Viet Nam, the growing burden of injuries and degenerative conditions has increased demand for services, while resource disparities persist, particularly in the Mekong Delta region. However, empirical data on the service capacity of provincial hospitals remain limited.* ***Objectives:*** *To assess the capacity for delivering orthopedic and trauma services at provincial general hospitals in the Mekong Delta region of Viet Nam in 2024.* ***Materials and methods:*** *A cross-sectional descriptive study was conducted in 2024 at 16 provincial general hospitals. Data were collected using a structured questionnaire and hospital records, and included information on the organization of orthopedic and rehabilitation services, human resources, equipment, clinical activities, training, and research. Data were analyzed using descriptive statistics.* ***Results:*** *All surveyed hospitals had an Orthopedics and Traumatology Department; however, only 81.3% had a dedicated Rehabilitation Unit or Department, most of which operated separately from orthopedics. Human resources were limited, with an estimated average of 1.3 orthopedic surgeons per 100,000 population. All hospitals were equipped with basic infrastructure such as operating tables and C-arm systems, but advanced equipment for arthroscopic and spine surgery was available in only a few centers. Professional activities and scientific research were modest, with limited participation in training programs and few international publications.* ***Conclusion:*** *Orthopedic and trauma services in the Mekong Delta region are relatively well established but remain uneven in terms of capacity and technological readiness. Strengthening the workforce, upgrading infrastructure and equipment, and more closely integrating rehabilitation services with orthopedic care are key strategies to improve the quality, efficiency, and equity of orthopedic services in this region.*

Keywords: *Orthopedic service, Orthopedic and trauma care, Health service capacity, Hospital management, Mekong Delta, Viet Nam.*

I. INTRODUCTION

Orthopedics and traumatology are a core specialty in modern health systems, encompassing prevention, diagnosis, surgery, and rehabilitation for musculoskeletal disorders and injuries. Globally, musculoskeletal conditions and trauma are among the leading causes of disability, pain, and productivity loss [1], [2], [3]. In Viet Nam, orthopedic services have expanded rapidly with progress in trauma care, joint replacement, arthroscopy, and pediatric orthopedics [3], [4]. However, this development is uneven: advanced services are concentrated in large urban tertiary hospitals, while many provincial hospitals still face shortages of infrastructure, trained staff, and modern technology [3]. These disparities are particularly important in high-demand regions such as the Mekong Delta.

The Mekong Delta bears a heavy burden of traffic and occupational injuries. Road traffic accidents remain a leading cause of death nationwide and contribute substantially to morbidity. The region's predominantly agricultural and manual labor workforce is also prone to degenerative joint diseases, chronic low back pain, and limb deformities, while population aging further increases the prevalence of osteoarthritis, osteoporosis, and fragility fractures [5], [6]. Provincial general hospitals, as key referral centers for both acute trauma and chronic musculoskeletal diseases, must respond to this rising demand, often with limited specialist staff, constrained diagnostic and surgical capacity, and insufficient rehabilitation services.

To address these challenges, the Government of Viet Nam has introduced policies prioritizing orthopedics and rehabilitation, including Decision No. 89/QD-TTg (2024) and the National Rehabilitation Development Plan 2021–2030 [7], [8]. These initiatives emphasize modernization of equipment, expansion of specialized services, and strengthening of human resources. Nevertheless, implementation gaps remain. Orthopedic surgeons and subspecialists are still concentrated in major cities; provincial hospitals frequently lack personnel for complex procedures such as joint replacement or spine surgery, and rehabilitation services are often understaffed and organizationally separated from orthopedic departments [6]. Empirical data on service capacity, technological readiness, and the organization of orthopedic and rehabilitation services in provincial hospitals in the Mekong Delta are scarce, limiting evidence-based planning.

This study aimed (1) to survey and describe the current status of orthopedic and rehabilitation services at public provincial hospitals in the Mekong Delta—focusing on organizational structure, human resources, equipment, and professional activities—and (2) to propose evidence-based recommendations to improve access, efficiency, and quality of orthopedic and trauma care in this region.

II. MATERIALS AND METHODS

2.1. Study design and setting

This was a descriptive cross-sectional study conducted from May to October 2025 at public provincial hospitals in the Mekong Delta region of Viet Nam. Institutional-level data covering the period from January 1, 2024, to December 31, 2024, were collected using a structured questionnaire developed by the research team. This questionnaire was administered to representatives of Orthopedics and Traumatology Departments (or equivalent units), focusing on the organization and capacity of orthopedic surgery and rehabilitation services.

2.2. Study population and hospital selection

The study population comprised public hospitals in the Mekong Delta. Hospitals were included if they: (1) were public hospitals in the region; (2) had an Orthopedics and Traumatology Department or trauma–musculoskeletal service unit; (3) provided inpatient care and/or orthopedic and trauma surgery during the study period; (4) agreed to participate and completed the standardized questionnaire; and (5) had information confirmed by an authorized representative (head or deputy head of department). Hospitals that did not return the questionnaire or provided incomplete, inconsistent, or unverifiable data were excluded.

2.3. Sampling strategy and sample size

A census sampling strategy was used. All eligible public hospitals were invited because the number of hospitals with orthopedic services in the region is limited and each plays an important role in the trauma care network. In total, 16 public hospitals completed the questionnaire and were included in the analysis.

2.4. Data collection and study variables

A structured, self-administered questionnaire, completed by department heads or deputy heads, included mainly closed-ended questions with a few open-ended items. Four domains were assessed: (1) organizational structure of orthopedic and rehabilitation services; (2) human resources (numbers and qualifications of orthopedic and rehabilitation staff); (3) infrastructure and equipment (operating rooms, basic and advanced surgical and imaging equipment); and (4) professional activities, training, and research (case volume, procedures, continuing education, and scientific output). Questionnaires were checked for completeness and internal consistency, and anonymized before analysis.

2.5. Statistical analysis

Data were coded and entered into Microsoft Excel 2021 (Microsoft Corporation, Redmond, WA, USA). Descriptive analyses were performed using Microsoft Excel 2021 and IBM SPSS Statistics for Windows, version 30.0 (IBM Corp., Armonk, NY, USA). Quantitative variables were summarized as frequencies, percentages, means, and ranges. Qualitative responses from open-ended items were grouped into themes and described narratively. All results are presented as aggregate institutional-level data without identifiers.

2.6. Ethics approval

The study was approved by the Ethics Committee in Biomedical Research of Can Tho University of Medicine and Pharmacy Hospital, Viet Nam (Approval No. 27/GCN-HDDDTNCYSH). Only institutional-level data were collected, with no patient-level information; therefore, individual informed consent was not required. Completion of the questionnaire by an authorized hospital representative was considered institutional consent.

III. RESULTS

3.1. Organizational structure

All 16 surveyed hospitals had a dedicated Orthopedics and Traumatology Department. In addition, 13 out of 16 hospitals (81.3%) had a Rehabilitation Department or Unit, of which 94.1% operated independently rather than being integrated within the Orthopedics and Traumatology Department.

3.2. Human resources

Across the 16 hospitals, a total of 201 physicians were working in Orthopedics and Traumatology Departments. These included 82 general practitioners, 25 physicians with a master's degree, 60 level-I specialists, 36 level-II specialists, and 23 physicians currently enrolled in postgraduate training programs. Only one physician (0.4%) held a Doctor of Philosophy (Ph.D.) degree.

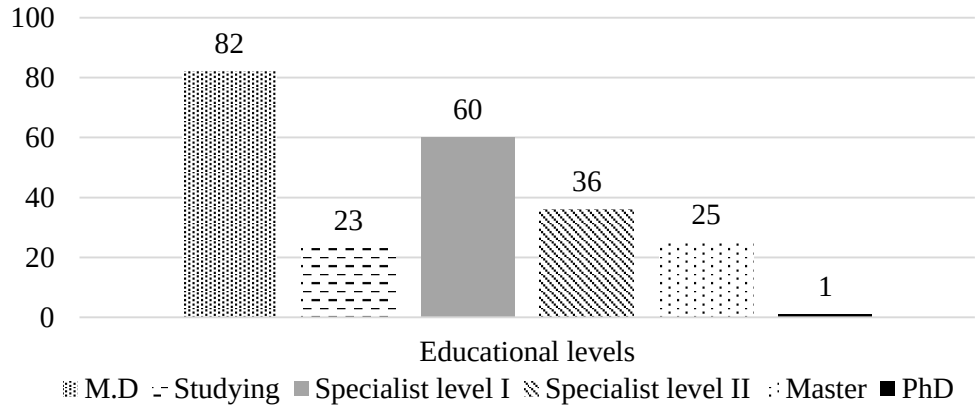

Figure 1. Distribution of orthopedic surgeons by professional and educational levels

Figure 1 indicates that most orthopedic surgeons are general practitioners or clinicians with level I–II specialist certificates, whereas surgeons with advanced academic degrees are scarce, with only a small number holding a master's degree and just one Ph.D.

3.3. Facilities and infrastructure

Table 1. Facilities and infrastructure

Facilities and infrastructure	Total
Inpatient rooms	258
Inpatient beds	1134
Outpatient clinics	22
Orthopedic operating rooms	50
Minor surgery rooms	21
Casting rooms	17

Table 1 indicates that the surveyed Orthopedics and Traumatology Departments have substantial capacity, with 258 inpatient rooms, 1,134 beds, 22 outpatient clinics, 50 operating rooms, 21 minor surgery rooms, and 17 casting rooms. However, functional room distribution is uneven: some hospitals have only one orthopedic operating room while others have three or more; minor surgery rooms are fairly balanced, but casting rooms are limited, as most hospitals have only one.

3.4. Professional activities, training, and research

The distribution of orthopedic surgical procedures by type among 26,173 operations performed at the surveyed hospitals. Type I surgeries accounted for 39.07% (n = 10,226), Type II for 35.58% (n = 9,313), special type procedures for 15.12% (n = 3,957), and Type III for 10.23% (n = 2,677).

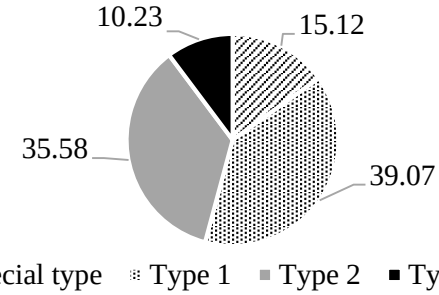

Figure 2. The distribution of orthopedic procedure type among institutions

Routine procedures (Types I and II) dominate the surgical workload, together representing nearly three-quarters of all operations, whereas special type and Type III surgeries form a much smaller proportion. Five of the sixteen hospitals reported no introduction of any new orthopedic procedures in the previous year. Among those that did innovate, most implemented only one or two new techniques, while only a small number of hospitals introduced three, indicating that technical innovation remains modest and concentrated in a few centers.

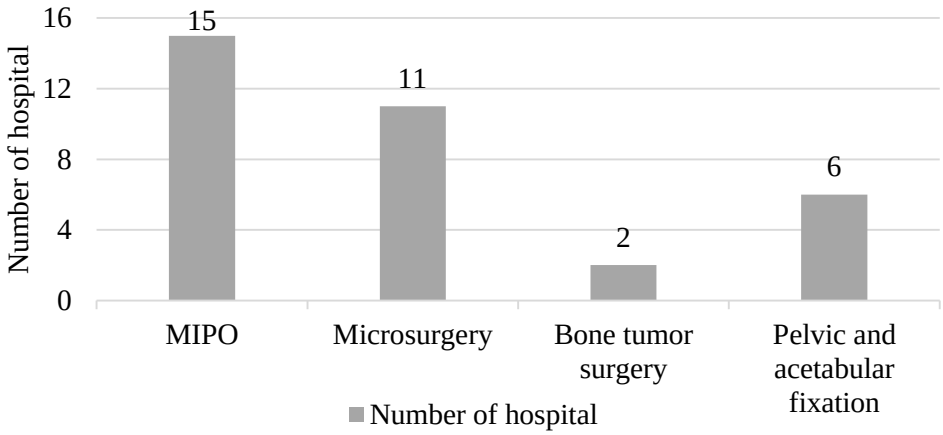

Figure 3. Number of specialized orthopedic procedures

Figure 3 illustrates the distribution of specialized orthopedic procedures across the surveyed hospitals. Among 16 hospitals, 15 performed minimally invasive plate osteosynthesis (MIPO), 11 carried out reconstructive microsurgery, 6 performed pelvic and acetabular fracture fixation, and only 2 conducted bone tumor surgery.

Regarding scientific publications, 12 hospitals reported no domestic articles and 14 had no international publications. Only a small number of hospitals reported having 1–5 domestic papers, and very few achieved 10 or more. For research projects, 12 hospitals had not conducted any provincial- or ministry-level studies, and 4 hospitals had not implemented even institution-level projects.

IV. DISCUSSION

This cross-sectional survey provides an overall picture of orthopedic and rehabilitation services in public provincial hospitals in the Mekong Delta, Viet Nam. All 16 hospitals had established Orthopedics and Traumatology Departments and were able to provide routine trauma and general orthopedic care.

First, the organizational structure of rehabilitation services remains fragmented and weakly integrated with orthopedic care. Although 13 of 16 hospitals (81.3%) had a Rehabilitation Department or Unit, almost all (94.1%) operated independently rather than being structurally or operationally linked to Orthopedics and Traumatology. This separation implies that musculoskeletal care is often delivered in a discontinuous manner, with limited coordination between surgery and rehabilitation. Recent evidence shows that integrated models that incorporate prehabilitation and early postoperative rehabilitation into orthopedic pathways can significantly improve muscle strength, pain control, mobility, and quality of life after procedures such as joint replacement and spine surgery [6], [9]. The current lack of integrated orthopedic–rehabilitation models in the Mekong Delta may therefore hinder the achievement of optimal functional outcomes and long-term recovery.

Second, the study underscores significant constraints in human resources. Based on the 2024 population of the Mekong Delta (17,529,037 inhabitants), the density of orthopedic surgeons is approximately 1.3 per 100,000 population, which is markedly lower than in Thailand (4.0), Myanmar (1.2), Japan (16.3), Taiwan (~9), the United States (9.25), and many European countries (5–20) [6], [9], [10], 11]. Most physicians are general practitioners or first-level specialists, with very few holding advanced academic degrees or subspecialty training. Furthermore, experienced surgeons are disproportionately concentrated in major metropolitan areas such as Ha Noi and Ho Chi Minh City, creating regional disparities and leaving provincial hospitals with relatively fewer senior staff [3], [4]. This combination of low density, limited subspecialization, and uneven distribution likely restricts the capacity to perform complex procedures, supervise trainees, and lead quality improvement and research activities at the provincial level.

Third, infrastructure and equipment show a combination of strengths and gaps. The surveyed hospitals reported sizable inpatient and operative capacity, including orthopedic operating rooms and universal access to at least one C-arm imaging system, which supports the high volume of trauma surgery observed. Nonetheless, advanced infrastructure for rehabilitation and subspecialty care remains limited. Two hospitals lacked dedicated rehabilitation beds or exercise tables, and seven had fewer than ten rehabilitation devices, constraining the ability to deliver intensive postoperative rehabilitation. Specialized equipment for complex arthroscopy, spine surgery, pelvic–acetabular fixation, or oncologic reconstruction was available only in a minority of centers. In addition, the physical and organizational separation between surgical and rehabilitation spaces complicates the implementation of standardized, protocol-driven postoperative pathways, despite evidence that early, coordinated rehabilitation reduces length of stay and improves functional outcomes after major orthopedic surgery [9], [11].

Fourth, the pattern of professional activities, training, and research reflects a workload heavily dominated by trauma with relatively limited subspecialty breadth and academic engagement. Most operative cases involved fracture fixation and other routine procedures, while complex elective surgeries such as arthroscopy, joint replacement, and spine surgery were less frequent and concentrated in better-resourced hospitals. This aligns with reports from other middle-income settings, where trauma accounts for over 80% of orthopedic work and elective subspecialty surgery remains underdeveloped [5]. There are, however, encouraging signs of modernization: many hospitals have adopted minimally invasive plate osteosynthesis (MIPO) and reconstructive microsurgery, and knee arthroscopy is now offered in 12 hospitals, with shoulder arthroscopy in 4 hospitals. In contrast, academic activity is modest. Only half of the hospitals organized scientific meetings, usually on a small scale; 12 hospitals had no domestic publications and 14 had no international publications. Most research projects were at institutional level, with very few at provincial or ministerial level. Limited funding, lack of mentorship, and weak clinical data systems likely contribute to this low output, whereas in many European and North American centers, residents are required to produce at least one peer-reviewed publication as part of their training, helping embed research culture in routine clinical practice [5], [12].

Given the high surgical volume dominated by routine orthopedic procedures and the limited provision of complex subspecialty care at many hospitals, several priorities could strengthen services in the Mekong Delta. These include: (1) workforce planning that expands and retains multidisciplinary teams (surgeons, anesthesia, perioperative nursing,

rehabilitation); (2) a hub-and-spoke referral network with clear transfer criteria for polytrauma and complex spine/pelvic trauma, arthroplasty, reconstruction, and musculoskeletal oncology; (3) targeted capacity building and resource allocation to improve trauma operating-room readiness, implant supply, imaging support, infection prevention, and perioperative critical care; and (4) stronger rehabilitation pathways and routine audit/registry to monitor outcomes and guide continuous quality improvement.

This study has two main strengths: it is the first region-wide assessment of orthopedic and rehabilitation services in public provincial hospitals in the Mekong Delta, and it achieved a 100% institutional response rate using a standardized questionnaire, providing a robust baseline for planning. However, data were self-reported, excluded the private sector, focused only on structural and resource indicators (rather than outcomes or patient experience), and reflected a single time point, limiting assessment of accuracy, generalizability, and temporal trends.

V. CONCLUSION

This study shows that while basic orthopedic and trauma care is available in public hospitals in Mekong Delta, there are major gaps in specialist staffing, infrastructure, and academic activity. Limited advanced equipment and weak integration with rehabilitation may hinder care quality, underscoring the need for targeted investment and multidisciplinary, rehabilitation-integrated models.

ACKNOWLEDGEMENTS

The research team sincerely expresses its gratitude to Can Tho University of Medicine and Pharmacy for providing support for this study under Decision No. 1737/QD-DHYDCT dated May 9th, 2025.

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