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Physiotherapy in Emergency Medicine: organizational integration and evaluation of a new acute-care model. A retrospective observational study at ASL Roma 2

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Keywords: physiotherapy; Emergency Medicine; acute medical care; service coverage; workforce; early mobilisation; functional assessment; resource planning.

ABSTRACT

Background. In Emergency Medicine units, physiotherapy must address motor and respiratory needs in complex patients, often with limited professional resources that are not exclusively dedicated to the unit. Describing service volume, coverage and response capacity is relevant to physiotherapy planning and resource governance.

Objective. To describe the volume, coverage, timeliness and response capacity of physiotherapy activity delivered by a single professional resource assigned to the Emergency Medicine unit, while secondarily characterising patients, interventions, pathways and outcomes and, in a selected subsample, pre-post changes in functional and symptom-related outcomes.

Methods. Retrospective observational study based on the clinical registry of the Emergency Medicine unit at Sant'Eugenio Hospital in Rome. A total of 335 physiotherapy episodes were analysed: 197 in 2025 and 138 in the first half of 2026, corresponding respectively to 684 and 377 hospital admissions. The service was provided by a single physiotherapist, present six hours per day from Monday to Saturday, not exclusively dedicated to the unit, with no Sunday or public-holiday coverage. All requests for functional assessment and physiotherapy management submitted by the unit physicians were assessed. In a selected subsample of 162 episodes, T0-T1 changes in the Barthel Index, Trunk Control Test, NRS and Borg scale were also explored, together with associations with timeliness and treatment days.

Results. The proportion of hospital admissions receiving physiotherapy assessment increased from 28.8% in 2025 to 36.6% in the first half of 2026 (difference 7.8

percentage points; p=0.009). Mean monthly physiotherapy episodes increased from 16.4 to 23.0, while physiotherapy episodes per bed/month increased from 1.09 to 1.28. Response capacity to received requests was 100% in both periods. The population had a median age of 77 years; 58.5% of episodes fell within respiratory clinical macro-areas. Barthel and Trunk scores were associated with final discharge destination, while no overall associations emerged between type of physiotherapy intervention and outcome. In the subsample with serial assessments, all outcomes showed a significant T0-T1 change (p<0.001); assessment within ≤24 hours was not associated with greater improvement, whereas treatment days were positively correlated with improvement in Barthel (ρ=0.882), Trunk (ρ=0.443), NRS (ρ=0.673) and Borg (ρ=0.382), all p<0.001.

Conclusions. A single shared physiotherapy resource, responding to demand from the clinical unit, ensured that all medical requests were addressed and achieved increasing service penetration despite the absence of Sunday and public-holiday coverage. The findings support the organisational value of a structured physiotherapy presence in Emergency Medicine. In the subsample with serial measures, functional and symptom-related improvement was also observed, with a dose-response relationship between treatment days and magnitude of change. These clinical analyses remain exploratory and do not allow causal inference.

Introduction

Rehabilitation is recognised as an essential health service and should be integrated across all levels of care. The World Health Organization identifies strengthening leadership, planning, the rehabilitation workforce and information systems among its priorities [1,2]. From this perspective, monitoring coverage is useful but must be interpreted precisely: crude coverage describes access to or use of a service, whereas effective coverage also requires estimation of need and quality of intervention [3].

In acute medical care, the physiotherapist integrates clinical, functional and environmental information, dynamically reassesses patient safety, and contributes to mobility, cardiorespiratory management and discharge planning [4]. This role is particularly relevant in older and multimorbid patients, in whom reduced mobility during hospitalisation is associated with functional decline [5]. A randomised trial in very old patients admitted with acute conditions also showed that an individualised multicomponent programme can counteract the functional deterioration observed with usual care [6].

In acute respiratory conditions, clinical studies have documented functional benefits of early mobilisation, with a possible reduction in length of stay in community-acquired pneumonia [7] and a reduction in physical disability after an acute exacerbation of COPD, without a demonstrated effect on hospital length of stay [8]. Overall, these findings support early intervention while also highlighting variability in outcomes according to population, intensity and organisational model.

Organisational evidence remains predominantly observational. Earlier physiotherapy input has been associated with shorter hospital stay and lower care needs at discharge in frail patients [9]. In a cohort of 7,693 general medicine patients, a higher daily dose of physiotherapy was associated with functional improvement and discharge home [10]. Studies of dedicated staffing [11] and rehabilitation models integrated into acute wards [12] suggest potential benefits, but their non-randomised nature and context specificity limit causal inference and transferability.

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There are still few real-world data on the volume, coverage and response capacity of physiotherapy services delivered by a single shared resource in Emergency Medicine. This study uses a structured clinical registry to describe these indicators in an Italian hospital unit, while retaining clinical characteristics, interventions and outcomes as secondary analyses useful for representing care complexity.

Organisational context and development of the care model

Since 2020, the Health Professions Unit (UOC Professioni Sanitarie) has progressively allocated physiotherapists to acute-care hospitals with the aim of facilitating timely patient management, functional assessment during hospitalisation and the definition, already in the hospital setting, of rehabilitation and care needs relevant to discharge planning and continuity with community services. In the absence of a specific national standard defining, within the framework of Ministerial Decree 70/2015, a numerical physiotherapist-to-bed ratio for acute inpatient wards, professional staffing was defined according to an organisational criterion adopted by the health authority, relating the number of physiotherapists to the bed capacity of the different hospital facilities and to the overall availability of staff, with distribution proportional to the size and care needs of the various hospitals. As part of this process, from 2025 one physiotherapist was assigned functionally also to the Emergency Medicine area, within an organisational model in which the resource was shared with other services. The introduction was also conceived as an organisational experience aimed at monitoring its effects in terms of timeliness of physiotherapy assessment and exploring associations with care outcomes, as well as, in the medium and long term, exploring the possible effect on hospital length of stay and on the ability to perform an early global assessment of the person, functional limitations and recovery potential. Sant'Eugenio Hospital was selected because Emergency Medicine and Emergency Care beds had already been available there since 2024, allowing the model to be observed in a setting that was active and established throughout the study period. This condition was not present at Sandro Pertini Hospital, where Emergency Medicine and Emergency Care beds were activated only at the end of the first half of 2026 and therefore did not allow a comparable observation period.

Objectives

Primary objective: to describe the volume, coverage, timeliness and response capacity of physiotherapy activity delivered by a single shared professional resource within the Emergency Medicine unit.

Secondary objectives: to describe the demographic, clinical and functional characteristics of episodes; diagnostic macro-areas and types of physiotherapy intervention; intermediate transfers and final outcomes; to descriptively compare 2025 with the first half of 2026; and to explore associations between function, care pathway and outcome. In a selected subsample with serial assessments, an additional objective was to describe T0-T1 changes in autonomy, trunk control, pain and dyspnoea and to analyse their association with timeliness of physiotherapy assessment and duration of physiotherapy treatment.

Materials and methods

Study design and setting

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Retrospective observational study based on a clinical registry of physiotherapy activity carried out in the Emergency Medicine unit of Sant'Eugenio Hospital in Rome. The observation period included the whole of 2025 and the first half of 2026.

Organisational structure and activity indicators

Physiotherapy activity was provided by a single physiotherapist, present six hours per day from Monday to Saturday, for a nominal total of 36 hours per week. The professional was not exclusively dedicated to Emergency Medicine and was simultaneously assigned to other services, which were not specified in the available data. No protected time slot was reserved for the unit: requests were managed according to care needs. No Sunday or public-holiday coverage was available.

In 2025 the unit had an average of approximately 15 beds and recorded 684 hospital admissions; in the first half of 2026 it had 20 beds and recorded 377 admissions. All physiotherapy requests made by unit physicians were assessed, and no unaddressed requests were recorded. The proportion of admissions receiving physiotherapy assessment was calculated as the ratio between physiotherapy episodes and total hospital admissions. Mean monthly admissions and physiotherapy episodes were also calculated, together with physiotherapy episodes per bed/month. Actual hours dedicated to the unit were not available; therefore, indicators per FTE or per working hour were not calculated.

Population and unit of analysis

All episodes in the frozen, pseudonymised database for which a physiotherapy assessment had been recorded were included. The unit of analysis was the hospital admission episode. Repeat admissions of the same patient were retained as separate episodes. The database included 335 episodes corresponding to 325 pseudonymised patients.

Data source and pseudonymisation

Analyses were conducted on the file DATABASE_ANALISI_PSEUDONIMIZZATO_v1.0.xlsx, derived from the frozen MASTER v1.2 Names and dates of birth are not included in the analysis database; each patient and each episode are identified by random codes. The re-identification key is stored separately. Because the database retains exact clinical dates, it is pseudonymised rather than fully anonymised.

Variables

Variables included: year, sex, age at admission, principal diagnosis, clinical macro-area, type of physiotherapy intervention, date and time of request and assessment, treatment days, hospital length of stay, Barthel Index [13], Trunk Control Test [14], NRS, Borg scale, intermediate transfer and final outcome. Interventions were classified into five mutually exclusive categories: motor; respiratory; motor + respiratory; motor + gait training; motor + respiratory + gait training. Secondary overlapping aggregations were also calculated according to the presence of a motor, respiratory and gait-training component; these aggregations were not mutually exclusive.

For the secondary outcome analysis, five clinical-care groups were defined: return/community continuity of care (home, CAD or supported discharge); residential/

rehabilitation post-acute care (RSA or rehabilitation); transfer to another acute-care facility; death; other/unknown (self-discharge or unknown outcome).

Time to physiotherapy assessment was calculated as the difference between the date/time of physiotherapy assessment and the date/time of the physiotherapy request and was expressed in hours. Indicators for assessment within 24 and within 48 hours were also created. Episodes with zero treatment days were classified as "assessment only".

Missing data management and quality control

"NV" values on functional scales indicated a patient who was not assessable and were not converted to a score of zero. These episodes were excluded only from calculation of the distribution of the relevant scale, while retaining the number of non-assessable cases. Barthel was available in 327 episodes and not assessable in 8; the Trunk Control Test was available in 320 episodes and not assessable in 15. NRS and Borg were available in all 335 episodes. The main categorical variables were complete; for final outcome, three episodes were classified as "UNKNOWN".

Extreme values identified using Tukey's criterion were retained because they were compatible with the registry and fell within the predefined plausibility ranges. No episode was excluded during preliminary quality control.

Statistical analysis

Given the non-normal distribution and/or discrete nature of some variables, continuous data were described using the median and interquartile range [Q1-Q3]. Categorical variables were reported as absolute frequencies and percentages. Types of physiotherapy intervention were described overall, by period and by clinical macro-area. Intermediate transfers and final outcomes were described in their original categories and using a priori clinical-care groupings. The comparison between 2025 and the first half of 2026 for the presence of intermediate transfer and the aggregated outcome distribution was performed using the chi-square test. Durations associated with outcomes were presented descriptively, without adjustment for clinical severity. The proportion of admissions receiving physiotherapy assessment was compared between periods using a chi-square test for two proportions; absolute difference, relative risk and 95% confidence intervals were reported.

A difference in the precision of recording time to physiotherapy assessment was also identified: in 2025, 73.6% of values were recorded exactly as 24 hours, compared with 3.6% in 2026. This element was considered when interpreting temporal comparisons.

Exploratory association analyses

Final outcomes were aggregated into five a priori groups: return/community continuity of care (home, CAD or supported discharge); residential/rehabilitation post-acute care (RSA or rehabilitation); transfer to another acute-care facility; death; other/unknown. Continuous variables were compared across the five groups using the Kruskal-Wallis test, with epsilon squared reported as an effect-size measure. Pairwise comparisons were performed using Mann-Whitney tests with Holm correction. Presence versus absence of intermediate transfer was compared using the Mann-Whitney test with rank-biserial correlation.

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Associations between categorical variables were assessed using chi-square tests with Monte Carlo p-values based on 20,000 permutations and Cramér's V. For analyses with sparse cells, macro-areas were also aggregated into four groups and the two interventions with both motor and respiratory components were combined. Exploratory logistic regression models with robust standard errors by patient ID were constructed: one model for return/community continuity of care and one model for death. Multivariable analyses used complete cases for Barthel (n=327). Type of treatment and intermediate transfer were variables observed during the care pathway and were not interpreted causally.

Narrative literature review

In July 2026, a targeted narrative literature review was conducted using PubMed/MEDLINE and official World Health Organization documents. Search terms related to physiotherapy/physical therapy, acute care, general medicine, emergency care, early mobilization, staffing, weekend services, referral screening, functional assessment, Barthel Index and discharge destination were used.

Institutional documents, clinical studies, observational studies and health-services research directly relevant to the acute medical setting and to the managerial objectives of the study were prioritised. Studies published from 2000 to 2026 were included, together with the original articles for the scales used. The review was not designed as a systematic review: no double screening, formal risk-of-bias assessment or meta-analysis was performed. The evidence was therefore used to contextualise and interpret the findings, not to produce pooled estimates of effectiveness.

Pre-post analysis of clinical outcomes in the selected subsample

For the pre-post analyses of clinical outcomes, a subsample of the overall cohort was selected, excluding patients who died during hospitalisation and patients who had received fewer than 5 physiotherapy sessions. The final sample comprised 162 T0-T1 pairs for the Barthel Index, Trunk Control Test, NRS 0-10 and Borg 0-10. The minimum threshold of 5 sessions was defined to include in the outcome analysis patients with a minimum exposure to the physiotherapy pathway, excluding episodes that were too brief to allow a clinically interpretable pre-post assessment. To standardise interpretation, deltas were oriented so that positive values always indicated improvement: ΔBarthel and ΔTrunk=T1-T0; ΔNRS and ΔBorg=T0-T1. T0-T1 comparisons were performed using the Wilcoxon signed-rank test for paired data, reporting effect size r. Timeliness was explored by comparing physiotherapy assessment ≤24 hours versus >24 hours using the Mann-Whitney U test and by correlating request-to-assessment time with deltas using Spearman's correlation. The relationship between treatment days and deltas was analysed using Spearman's correlation; in a secondary analysis, treatment days were stratified into 5-7, 8-10 and ≥11 days and compared using the Kruskal-Wallis test with ε^2. These analyses were considered exploratory.

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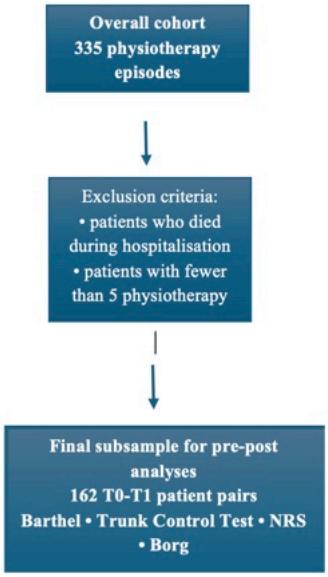

Figure 1. Flow chart of subsample selection for clinical outcome analyses.

Results

Organisational structure, volume and coverage

In 2025, 684 hospital admissions and 197 physiotherapy episodes were recorded, corresponding to 28.8% of admissions. In the first half of 2026, there were 377 admissions and 138 physiotherapy episodes, corresponding to 36.6%. The difference was 7.8 percentage points (95% CI 1.9-13.7; χ^2=6.850; p=0.009); the ratio between the two proportions was 1.27 (95% CI 1.06-1.52).

Mean monthly hospital admissions increased from 57.0 to 62.8 (+10.2%), while mean monthly physiotherapy episodes increased from 16.4 to 23.0 (+40.1%). After standardisation for bed capacity and period duration, physiotherapy episodes increased from 1.09 to 1.28 per bed/month (+16.8%).

Response capacity to received requests was 100% in both periods: all requests submitted by unit physicians were assessed and no unaddressed requests were recorded. This indicator describes completion of requests received, but does not quantify the potential physiotherapy need among patients who were not referred.

Indicator	2025	2026, first half	Change / comparison
Beds	approximately 15	20	+20,0%
Total hospital admissions	684	377	periods of different duration
Mean monthly hospital admissions	57,0	62,8	+10,2%
Physiotherapy episodes	197	138	periods of different duration
Mean monthly physiotherapy episodes	16,4	23,0	+40,1%
Proportion of admissions with physiotherapy assessment	28,8%	36,6%	+7.8 percentage points; p=0.009
Admissions per bed/month	3,80	3,49	−8,1%
Physiotherapy episodes per bed/month	1,09	1,28	+16,8%
Medical requests completed	100%	100%	no unaddressed requests
Physiotherapists available	1, shared	1, shared	no increase
Service coverage	Mon–Sat, 6 h/day	Mon–Sat, 6 h/day	no Sunday/public-holiday coverage

Table 1 Organisational indicators and coverage of physiotherapy activity

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Note. The proportion of hospital admissions receiving physiotherapy assessment does not correspond to coverage of potential need, because access depended on medical referral. The 2025 bed count is an approximate average; in 2026 there were 20 beds. Actual hours dedicated to Emergency Medicine were not available.

Sample and data completeness

A total of 335 episodes were included, 197 recorded in 2025 and 138 in the first half of 2026. The episodes referred to 325 pseudonymised patients. The main demographic, clinical and organisational variables were complete. Eight episodes had Barthel not assessable and 15 had Trunk Control Test not assessable. NRS and Borg were available in all 335 episodes.

Demographic and functional characteristics

The overall median age was 77.0 years [67.5-83.0], with values ranging from 20 to 102 years. Female patients accounted for 44.5% of episodes and male patients for 55.5%. The median Barthel Index score was 30.0 [20.0-35.0]; the median Trunk Control Test score was 70.0 [48.0-80.0], the median NRS score was 4.0 [3.0-4.0], and the median Borg score was 7.0 [4.0-8.0].

Timeliness of physiotherapy assessment and duration

The median time between physiotherapy request and assessment was 24.0 hours [24.0-26.6]. Assessment occurred within 24 hours in 225 episodes (67.2%) and within 48 hours in 309 episodes (92.2%). Median treatment duration was 5 days [3-10], while median hospital length of stay was 16 days [10-25]. Two episodes (0.6%) consisted of physiotherapy assessment only.

Description by period

In 2025, median age was 77.0 years [68.0-83.0] and in the first half of 2026 it was 76.0 years [65.2-84.0]. Median time to physiotherapy assessment was 24.0 hours [24.0-24.0] and 26.3 hours [20.4-31.7], respectively. Assessment occurred within 24 hours in 84.8% and 42.0% of episodes, and within 48 hours in 95.4% and 87.7%.

Variable	Total (n=335)	2025 (n=197)	2026, first half (n=138)	Notes
General characteristics				
Episodes, n	335	197	138	
Unique patients, n	325	188	137	
Age, years, median [IQR]	77,0 [67,5–83,0]	77,0 [68,0–83,0]	76,0 [65,2–84,0]	
Female sex, n (%)	149 (44,5%)	87 (44,2%)	62 (44,9%)	
Male sex, n (%)	186 (55,5%)	110 (55,8%)	76 (55,1%)	
Functional scales				
Barthel, median [IQR]	30,0 [20,0–35,0]	30,0 [20,0–35,0]	30,0 [20,0–35,0]	Assessable: total 327; 2025 n=189; 2026 n=138.
Barthel not assessable, n (%)	8 (2,4%)	8 (4,1%)	0 (0,0%)	
Trunk Control Test, median [IQR]	70,0 [48,0–80,0]	70,0 [48,0–87,0]	61,0 [48,0–75,0]	Assessable: total 320; 2025 n=182; 2026 n=138.
Trunk not assessable, n (%)	15 (4,5%)	15 (7,6%)	0 (0,0%)	
NRS, median [IQR]	4,0 [3,0–4,0]	4,0 [3,0–4,0]	4,0 [3,0–4,0]	Assessable: total 335; 2025 n=197; 2026 n=138

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NRS not assessable, n (%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	
Borg, median [IQR]	7,0 [4,0–8,0]	7,0 [4,0–8,0]	7,0 [5,0–8,0]	Assessable: total 335; 2025 n=197; 2026 n=138
Borg not assessable, n (%)	0 (0,0%)	0 (0,0%)	0 (0,0%)	
Assessment and duration				
Time to physiotherapy assessment, hours, median [IQR]	24,0 [24,0–26,6]	24,0 [24,0–24,0]	26,3 [20,4–31,7]	
Treatment days, median [IQR]	5,0 [3,0–10,0]	5,0 [3,0–10,0]	5,0 [2,0–9,8]	
Length of stay, days, median [IQR]	16,0 [10,0–25,0]	16,0 [10,0–25,0]	15,0 [9,0–24,8]	
Assessment within 24 hours, n (%)	225 (67,2%)	167 (84,8%)	58 (42,0%)	
Assessment within 48 hours, n (%)	309 (92,2%)	188 (95,4%)	121 (87,7%)	
Assessment only, n (%)	2 (0,6%)	2 (1,0%)	0 (0,0%)	

Table 2 Characteristics of hospital admission episodes

Note 1. Data are expressed as median [Q1-Q3] or n (%), unless otherwise specified.

Note 2. Percentages for categorical variables use all episodes in the relevant period as the denominator.

Note 3. NV indicates a patient who was not assessable and does not correspond to a score of 0.

Note 4. The 2026 period includes the first half of the year. The different precision of time recordings between 2025 and 2026 limits direct comparison of time to physiotherapy assessment.

Diagnoses and clinical macro-areas

Respiratory macro-areas accounted for 196 episodes (58.5%), followed by cardiovascular conditions with 50 episodes (14.9%), musculoskeletal/trauma conditions with 42 (12.5%), non-respiratory infectious conditions with 18 (5.4%), and neurological conditions with 14 (4.2%). The remaining four macro-areas contributed a total of 15 episodes (4.5%).

In 2025, respiratory macro-areas accounted for 61.4% of episodes compared with 54.3% in the first half of 2026; over the same comparison, the cardiovascular proportion was 11.2% and 20.3%, respectively. These differences are presented descriptively only, given the presence of low-frequency categories and the different duration of the observation periods.

A total of 52 distinct diagnoses were recorded. The most frequent were pneumonia (96 episodes; 28.7%), respiratory failure (55; 16.4%), acute coronary syndrome (41; 12.2%), acute exacerbation of COPD (23; 6.9%), and polytrauma (22; 6.6%). The three most frequent diagnoses accounted for 192 episodes (57.3%). The 11 diagnoses with at least five episodes represented 83.0% of the sample overall; the remaining 41 diagnoses contributed 57 episodes (17.0%).

Category	Total (n=335)	2025 (n=197)	2026, first half (n=138)
A. Clinical macro-areas			
Respiratory	196 (58,5%)	121 (61,4%)	75 (54,3%)
Cardiovascular	50 (14,9%)	22 (11,2%)	28 (20,3%)
Musculoskeletal/Trauma	42 (12,5%)	26 (13,2%)	16 (11,6%)
Non-respiratory infectious	18 (5,4%)	7 (3,6%)	11 (8,0%)

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Neurological	14 (4,2%)	11 (5,6%)	3 (2,2%)
Gastroenterological	7 (2,1%)	7 (3,6%)	0 (0,0%)
Onco-haematological	4 (1,2%)	2 (1,0%)	2 (1,4%)
Nephrological/Urological	3 (0,9%)	1 (0,5%)	2 (1,4%)
Metabolic/Endocrinological	1 (0,3%)	0 (0,0%)	1 (0,7%)
B. Diagnoses with at least 5 episodes			
Pneumonia	96 (28,7%)	62 (31,5%)	34 (24,6%)
Respiratory failure	55 (16,4%)	26 (13,2%)	29 (21,0%)
Acute coronary syndrome (ACS)	41 (12,2%)	16 (8,1%)	25 (18,1%)
Acute exacerbation of COPD	23 (6,9%)	16 (8,1%)	7 (5,1%)
Polytrauma	22 (6,6%)	15 (7,6%)	7 (5,1%)
Pleural effusion	13 (3,9%)	11 (5,6%)	2 (1,4%)
Multiple rib fractures	6 (1,8%)	3 (1,5%)	3 (2,2%)
Urosepsis	6 (1,8%)	2 (1,0%)	4 (2,9%)
Septic shock	6 (1,8%)	1 (0,5%)	5 (3,6%)
Femoral fracture	5 (1,5%)	2 (1,0%)	3 (2,2%)
Pulmonary embolism	5 (1,5%)	1 (0,5%)	4 (2,9%)
Other diagnoses (n<5 each)	57 (17,0%)	42 (21,3%)	15 (10,9%)

Table 3 Distribution of clinical macro-areas and main diagnoses

Note. Data are expressed as n (%). The unit of analysis is the episode. The 2026 period includes the first half of the year. Differences between periods are presented descriptively; no overall test was applied at this stage because of the presence of rare categories.

Types of physiotherapy intervention

The most frequent interventions were motor physiotherapy, recorded in 98 episodes (29.3%), respiratory physiotherapy in 97 (29.0%), and motor physiotherapy combined with gait training in 85 (25.4%). Motor + respiratory physiotherapy was recorded in 52 episodes (15.5%), while the combination of motor + respiratory physiotherapy + gait training occurred in 3 episodes (0.9%).

In 2025, interventions were recorded as motor in 47.2% of episodes, respiratory in 43.7%, and motor + gait training in 9.1%. In the first half of 2026, motor + gait training (48.6%) and motor + respiratory (37.7%) predominated. The motor + respiratory and motor + respiratory + gait training categories were not recorded in 2025. This discontinuity limits direct comparison between periods and does not allow determination of whether the differences reflect clinical practice, recording methods or recoding.

In the secondary aggregation, a motor component was present in 238 episodes (71.0%), a respiratory component in 152 (45.4%), and gait training in 88 (26.3%). These percentages overlap and should not be added together. Median treatment duration was 5 days for motor, respiratory and motor + gait training interventions, and 6 days for motor + respiratory interventions. The full combination had a median of 22 days, but included only three episodes and should be interpreted cautiously.

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Type of physiotherapy intervention

Type of physiotherapy intervention	Total (n=335)	2025 (n=197)	2026, first half (n=138)	Treatment days, median [Q1–Q3]
Motor	98 (29,3%)	93 (47,2%)	5 (3,6%)	5 [3–10]
Respiratory	97 (29,0%)	86 (43,7%)	11 (8,0%)	5 [3–10]
Motor + respiratory	52 (15,5%)	0 (0,0%)	52 (37,7%)	6 [3–10,25]
Motor + gait training	85 (25,4%)	18 (9,1%)	67 (48,6%)	5 [2–10]
Motor + respiratory + gait training	3 (0,9%)	0 (0,0%)	3 (2,2%)	22 [19,5–22]
Secondary aggregations by component				
Motor component	238 (71,0%)	111 (56,3%)	127 (92,0%)	–
Respiratory component	152 (45,4%)	86 (43,7%)	66 (47,8%)	–
Gait training	88 (26,3%)	18 (9,1%)	70 (50,7%)	–

Table 4 Distribution of types of physiotherapy intervention

Note. The five intervention types are mutually exclusive categories. Component-based aggregations are secondary analyses and should not be summed. The 2026 period includes the first half of the year. The two combined categories with a respiratory component were not recorded in 2025; therefore, the temporal comparison is descriptive.

Intermediate transfers and final outcomes

An intermediate transfer was documented in 107 episodes (31.9%), while 228 episodes (68.1%) involved no transfer to another ward before the final outcome. The most frequent transfer destination was Acute Medicine, involving 69 episodes (20.6% of the total), followed by Non-COVID Medicine (12; 3.6%) and Geriatrics (11; 3.3%). The proportion of episodes with an intermediate transfer was similar in 2025 and the first half of 2026 (31.5% vs 32.6%; χ^2=0.010; p=0.920).

The most frequent final outcomes were discharge home (94; 28.1%) and supported discharge (82; 24.5%). These were followed by death (40; 11.9%), transfer to another acute-care facility (38; 11.3%), rehabilitation (30; 9.0%), CAD (23; 6.9%) and RSA (17; 5.1%). Overall, 199 episodes (59.4%) were included in the return/community continuity-of-care group and 47 (14.0%) in residential or rehabilitation post-acute care.

The aggregated outcome distribution was comparable between the two periods (χ^2=1.586; p=0.811). The most frequent exact pathways were no transfer → supported discharge (66 episodes; 19.7%), no transfer → home (54; 16.1%), Acute Medicine → home (29; 8.7%), and no transfer → other acute-care facility (29; 8.7%). These associations describe the observed care sequence and do not allow causal interpretation.

Intermediate transfer	Total (n=335)	2025 (n=197)	2026, first half (n=138)
No transfer	228 (68,1%)	135 (68,5%)	93 (67,4%)
Acute Medicine	69 (20,6%)	47 (23,9%)	22 (15,9%)
Non-COVID Medicine	12 (3,6%)	2 (1,0%)	10 (7,2%)
Geriatrics	11 (3,3%)	5 (2,5%)	6 (4,3%)
Urology	3 (0,9%)	1 (0,5%)	2 (1,4%)
Intensive Care	3 (0,9%)	1 (0,5%)	2 (1,4%)
Nephrology	2 (0,6%)	2 (1,0%)	0 (0,0%)

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Neurology	2 (0,6%)	2 (1,0%)	0 (0,0%)
Cardiology	2 (0,6%)	0 (0,0%)	2 (1,4%)
General Surgery	1 (0,3%)	1 (0,5%)	0 (0,0%)
UTIC	1 (0,3%)	1 (0,5%)	0 (0,0%)
SPDC	1 (0,3%)	0 (0,0%)	1 (0,7%)

Table 5 Distribution of intermediate transfers

Note. Data are expressed as n (%). The aggregated comparison between presence and absence of intermediate transfer showed no difference between periods (χ^2=0.010; p=0.920).

Final outcome	Total (n=335)	2025 (n=197)	2026, first half (n=138)
Home	94 (28,1%)	50 (25,4%)	44 (31,9%)
Supported discharge	82 (24,5%)	49 (24,9%)	33 (23,9%)
Death	40 (11,9%)	26 (13,2%)	14 (10,1%)
Other acute-care facility	38 (11,3%)	23 (11,7%)	15 (10,9%)
Rehabilitation	30 (9,0%)	17 (8,6%)	13 (9,4%)
CAD	23 (6,9%)	16 (8,1%)	7 (5,1%)
RSA	17 (5,1%)	11 (5,6%)	6 (4,3%)
Self-discharge	8 (2,4%)	3 (1,5%)	5 (3,6%)
Unknown	3 (0,9%)	2 (1,0%)	1 (0,7%)
Clinical-care aggregations			
Return/community continuity of care	199 (59,4%)	115 (58,4%)	84 (60,9%)
Residential/rehabilitation post-acute care	47 (14,0%)	28 (14,2%)	19 (13,8%)
Transfer to another acute-care facility	38 (11,3%)	23 (11,7%)	15 (10,9%)
Death	40 (11,9%)	26 (13,2%)	14 (10,1%)
Other/unknown	11 (3,3%)	5 (2,5%)	6 (4,3%)

Table 6 Distribution of final outcomes

Note. Return/community continuity of care = home, CAD or supported discharge; post-acute care = RSA or rehabilitation. The aggregated outcome distribution did not differ between periods (χ^2=1.586; p=0.811).

Associations between clinical characteristics, care pathway and outcome

Barthel and Trunk Control Test scores differed across the five aggregated outcome groups (Barthel: H=24.761; p<0.001; ε^2=0.064; Trunk: H=26.056; p<0.001; ε^2=0.070). After Holm correction, the return/community continuity-of-care group had higher Barthel and Trunk scores than the transfer to another acute-care facility and death groups. Treatment days also differed across outcomes (H=22.200; p<0.001; ε^2=0.055): duration was longer in post-acute pathways and transfers for acute care than in the community-return group. Hospital length of stay showed a small overall difference (p=0.021; ε^2=0.023), with no significant pairwise comparisons after correction.

No overall associations emerged between aggregated outcome and clinical macro-area

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(p=0.894; V=0.126), type of physiotherapy intervention (p=0.252; V=0.120), presence of intermediate transfer (p=0.110; V=0.149), sex (p=0.449) or period 2025-2026 (p=0.811). Time to physiotherapy assessment was also similar across outcomes (p=0.385). These findings do not demonstrate equivalence, but indicate the absence of an overall association detectable in this sample.

Episodes with an intermediate transfer had a slightly lower Barthel score (median 25 vs 30; p=0.035), fewer treatment days (5 vs 6; p=0.002), and a longer hospital stay (18 vs 15 days; p=0.025). Presence of transfer was associated with the aggregated clinical macro-area (p=0.014; V=0.178) and aggregated type of physiotherapy intervention (p=0.018; V=0.174), with higher proportions in respiratory interventions and interventions containing both motor and respiratory components. Effect sizes were nevertheless small.

In the multivariable model for return/community continuity of care (n=327), each 10-point increase in Barthel was associated with higher odds of the outcome (OR 1.50; 95% CI 1.26-1.77; p<0.001). Presence of an intermediate transfer was associated with higher odds of subsequent community return (OR 2.04; 95% CI 1.20-3.48; p=0.008), a finding that describes a care sequence rather than a beneficial effect of transfer. Adding type of physiotherapy intervention did not materially alter these estimates, and no intervention category was independently associated with the outcome. In the mortality model, Barthel was inversely associated with death (OR 0.62 per 10 points; 95% CI 0.45-0.87; p=0.005); age showed a non-significant trend (OR 1.36 per 10 years; p=0.083).

Variable	Return/community continuity of care	Post-acute care	Other acute-care facility	Death	Other/unknown	P
Age, years	75,0 [66,0–82,0]	77,0 [69,5–83,0]	79,0 [71,0–84,0]	82,5 [73,5–85,2]	71,0 [57,0–78,0]	0,065
Barthel	30,0 [20,0–40,0]	25,0 [20,0–32,5]	25,0 [15,0–33,8]	20,0 [15,0–31,2]	30,0 [17,5–47,5]	<0,001
Trunk Control Test	75,0 [48,0–100,0]	61,0 [30,0–75,0]	61,0 [24,0–71,0]	48,0 [24,0–67,8]	87,5 [51,2–100,0]	<0,001
NRS	4,0 [3,0–4,0]	4,0 [3,0–4,0]	4,0 [3,0–4,0]	4,0 [4,0–4,0]	4,0 [3,5–5,5]	0,354
Borg	7,0 [4,0–8,0]	7,0 [4,0–8,0]	7,0 [6,25–8,0]	7,0 [5,75–8,0]	5,0 [4,0–6,5]	0,108
Time to physiotherapy assessment, hours	24,0 [24,0–28,6]	24,0 [24,0–25,3]	24,0 [24,0–26,3]	24,0 [23,7–27,3]	24,0 [20,0–24,0]	0,385
Treatment days	4,0 [2,0–8,0]	7,0 [4,5–12,0]	8,0 [5,0–14,8]	6,0 [2,0–11,0]	3,0 [1,5–5,0]	<0,001
Length of stay, days	15,0 [10,0–23,0]	20,0 [13,0–31,5]	17,5 [11,0–36,5]	16,5 [7,8–25,5]	9,0 [7,0–18,5]	0,021
Intermediate transfer, n (%)	73 (36,7%)	11 (23,4%)	9 (23,7%)	13 (32,5%)	1 (9,1%)	0,110

Table 7 Clinical characteristics according to aggregated outcome

Note. Continuous data are expressed as median [Q1-Q3]. P values are from Kruskal-Wallis tests; for intermediate transfer, p is from a chi-square test with 20,000 Monte Carlo permutations. Barthel was available in 327 episodes and Trunk in 320.

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Model / predictor	OR	95% CI	P
A. Return/community continuity of care (n=327; events=195)			
Age per 10 years	0,96	0,79–1,16	0,654
Female sex	0,72	0,43–1,18	0,188
Barthel per 10 points	1,50	1,26–1,77	<0,001
Year 2026	1,08	0,62–1,88	0,777
Intermediate transfer	2,04	1,20–3,48	0,008
Physiotherapy assessment >24 hours	1,07	0,59–1,93	0,819
Cardiovascular macro-area	0,83	0,43–1,58	0,566
Musculoskeletal/trauma macro-area	0,77	0,35–1,71	0,524
Other macro-areas	1,92	0,89–4,14	0,097
B. Death (n=327; events=36)			
Age per 10 years	1,36	0,96–1,93	0,083
Barthel per 10 points	0,62	0,45–0,87	0,005
Year 2026	0,84	0,40–1,73	0,631
Intermediate transfer	0,92	0,42–2,01	0,832
Respiratory macro-area	0,93	0,45–1,90	0,843

Table 8 Exploratory logistic regression models

Note. Logistic regression with robust standard errors by patient ID. Model A: reference categories = male sex, year 2025, no transfer, physiotherapy assessment ≤24 hours and respiratory macro-area. Model B: reference categories = year 2025, no transfer and non-respiratory macro-area. Estimates describe associations, not causal effects.

Pre-post analysis of functional and symptom-related outcomes

In the subsample with serial assessments, all outcomes showed a statistically significant change in the direction of improvement. Barthel increased from a median of 30 [20-35] to 41 [34-45.8], with a median Δ of +13 [9-16] ($p<0.001$; $r=0.868$). The Trunk Control Test increased from 61 [48-75] to 70 [55.2-80.8], with Δ +8 [4-13] ($p<0.001$; $r=0.824$). NRS decreased from 4 [3-4] to 2 [2-2], with a median reduction of 2 points ($p<0.001$; $r=0.871$), while Borg decreased from 7 [5-8] to 6 [4-6], with a median reduction of 1 point ($p<0.001$; $r=0.854$).

Outcome	n	T0, median [IQR]	T1, median [IQR]	Favourable Δ, median [IQR]	Improved	p; r
Barthel	162	30 [20-35]	41 [34-45,8]	+13 [9-16]	162 (100,0%)	<0,001; 0,868
Trunk	162	61 [48-75]	70 [55,2-80,8]	+8 [4-13]	146 (90,1%)	<0,001; 0,824
NRS	162	4 [3-4]	2 [2-2]	+2 [1-2]	157 (96,9%)	<0,001; 0,871
Borg	162	7 [5-8]	6 [4-6]	+1 [1-1]	141 (87,6%)	<0,001; 0,854

Table 9 Pre-post change in clinical outcomes in the selected subsample.

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Timeliness and magnitude of improvement

Physiotherapy assessment within 24 hours was not associated with significantly greater deltas than assessment after 24 hours: Barthel p=0.996; Trunk p=0.535; NRS p=0.713; Borg p=0.380. When request-to-assessment time was considered as a continuous variable, correlations with improvement were also negligible and non-significant (Barthel ρ=0.033, p=0.680; Trunk ρ=0.045, p=0.574; NRS ρ=-0.043, p=0.591; Borg ρ=0.048, p=0.546).

Treatment days and the positive relationship between treatment duration and magnitude of change

The number of treatment days showed a positive and statistically significant relationship with improvement in all outcomes: Barthel ρ=0.882, Trunk ρ=0.443, NRS ρ=0.673 and Borg ρ=0.382 (all p<0.001). Stratification into 5-7, 8-10 and ≥11 treatment days confirmed significant differences for Barthel (H=111.99; p<0.001; ε^2=0.692), Trunk (H=31.47; p<0.001; ε^2=0.185), NRS (H=61.10; p<0.001; ε^2=0.374) and Borg (H=22.54; p<0.001; ε^2=0.130).

Outcome	n	Spearman ρ	p	Strength of association
Barthel	162	0,882	<0,001	Strong
Trunk	162	0,443	<0,001	Moderate
NRS	162	0,673	<0,001	Strong
Borg	162	0,382	<0,001	Moderate

Table 10 Correlation between treatment days and clinical improvement.

Discussion

Main findings and organisational relevance

The main finding of the study is organisational: a single physiotherapy resource, shared with other services, present six hours per day from Monday to Saturday and without Sunday or public-holiday coverage, assessed all medical requests received. At the same time, the proportion of hospital admissions reached increased from 28.8% to 36.6%, and physiotherapy episodes per bed/month increased from 1.09 to 1.28. The increase in mean monthly activity exceeded the increase in hospital admissions, suggesting greater integration of the service within the unit despite no increase in the number of physiotherapists.

These indicators are consistent with the international call to integrate rehabilitation into health systems and to generate data useful for planning [1-3]. However, the 28.8-36.6% figure should be defined as crude coverage of hospital admissions: the registry shows that all requests received were addressed, but it does not identify patients with a potential need who were not referred. Consequently, effective coverage of rehabilitation need cannot be estimated according to the broader concept proposed by the WHO [3].

Physiotherapy, mobility and function in acute medical care

The observed population was older, clinically heterogeneous and characterised by low functional scores. This profile is consistent with the role described for physiotherapists in acute care, which requires clinical reasoning, continuous reassessment, safety management

and coordination of discharge [4]. The literature shows that low mobility during hospitalisation is associated with functional decline [5] and that individualised exercise programmes can preserve or improve function in very old patients admitted with acute conditions [6].

The prevalence of respiratory macro-areas in the registry makes studies on pneumonia and acute exacerbations of COPD particularly relevant. Early mobilisation reduced length of stay in a pneumonia trial [7], whereas an intervention using walking aids in COPD reduced disability without changing hospital length of stay [8]. The heterogeneity of these findings argues against using length of stay alone as an indicator of physiotherapy effectiveness; function, safety, final destination and continuity of care remain equally relevant outcomes.

Timeliness, dose and physiotherapy staffing

In the sample, 67.2% of assessments occurred within 24 hours and 92.2% within 48 hours. Timeliness is a plausible indicator of organisational quality, but the different temporal recording precision between 2025 and 2026 requires caution in the present registry. In frail patients, earlier physiotherapy input has been associated with shorter length of stay and lower care needs at discharge [9], but the observational design does not allow confounding to be excluded.

The most recent analysis of 7,693 general medicine patients identified a dose-response association between physiotherapy minutes per day, functional improvement and discharge home, with attenuation of benefit beyond approximately 30 minutes/day [10]. Similarly, dedicated ward physiotherapy staffing was associated with greater functional gain in a difference-in-differences study, although it was limited to patients with acute cholangitis [11]. An in-reach rehabilitation model integrated into acute wards also showed a higher rate of discharge home compared with patients on a waiting list [12].

This evidence makes measurement of professional time strategically important. In our study, total contracted hours and the number of episodes are known, but not the actual hours dedicated to Emergency Medicine or the duration of individual sessions. It is therefore not appropriate to calculate productivity per FTE or to interpret episodes per bed/month as a measure of therapeutic dose. Prospective recording of hours, treatment minutes and indirect activities is the necessary next step for a reliable estimate of staffing requirements.

Medical-referral model and identification of need

Completion of 100% of requests is an indicator of response capacity and a strength of the service. However, a model based exclusively on medical referral may depend on the clinical team's ability to recognise motor, respiratory and discharge-planning needs early.

In emergency and medical assessment settings, structured tools have been developed to identify patients requiring allied health input. RAPaRT showed promising discriminatory ability in its development study [15] and consistent performance in external validation, in which 60% of patients were considered appropriate for at least one allied health referral [16]. These data do not justify automatic adoption of the tool in our setting, but they support future evaluation of screening criteria shared with physicians to distinguish completed referrals from potential need that has actually been identified.

Sunday and public-holiday coverage

The absence of Sunday and public-holiday coverage represents an organisational discontinuity, but the literature does not support the conclusion that indiscriminate

extension to seven-day services necessarily improves outcomes. In two cluster stepped-wedge trials conducted in medical and surgical wards, results from removing and subsequently reintroducing multidisciplinary weekend services were discordant; in the second trial, absence of the weekend service was non-inferior to the redesigned model for the main outcomes [17].

For managers, the implication is not to maintain or expand coverage a priori, but to measure local need on uncovered days: requests generated, eligible patients, Monday delays, impact on care pathways and the presence of time-sensitive clinical conditions. Any pilot programme should favour a targeted model based on priority criteria or on-call availability, with prospective evaluation of outcomes and costs.

Functional assessment and final destination

In the registry, Barthel and Trunk Control Test scores differed across final destinations; Barthel also retained an independent association with community return and death. This finding is consistent with studies in older hospital populations in which Barthel is associated with mortality, length of stay and discharge destination [18]. The scale may therefore contribute to functional stratification and pathway planning without replacing multidimensional clinical assessment.

The Trunk Control Test was originally validated in people with stroke, demonstrating reliability and predictive value for recovery of walking [14]. In the present multi-diagnostic sample, its use should be considered descriptive and exploratory: the observed association does not constitute validation of the scale in Emergency Medicine.

Implications for physiotherapy management

The findings and the literature converge on five operational priorities: formalising time dedicated to the unit; measuring treatment hours and minutes in addition to the number of episodes; supplementing medical referral with shared screening criteria; monitoring need on days without coverage; and ensuring organisational continuity when the sole physiotherapist is absent. The dashboard should distinguish received demand, potential need, utilisation, timeliness, dose and functional outcomes.

The present study does not demonstrate that increasing staff automatically produces better outcomes, but it documents growth in activity and dependence on a single resource. This combination provides a rational basis for a prospective phase of workload measurement and subsequent evaluation of organisational scenarios, including protected dedicated time or a support model during periods of higher demand.

Serial outcomes and dose-response relationship

Analysis of the subsample with serial assessments adds a clinical dimension to the organisational findings of the registry. During the physiotherapy pathway, significant improvements were observed in autonomy, trunk control, pain and dyspnoea. In particular, pain measured using the NRS decreased from a median of 4 [3-4] to 2 [2-2], with a median reduction of 2 points. Request-to-assessment timeliness, both using the 24-hour threshold and as a continuous variable, was not associated with the magnitude of recovery. This finding is consistent with the previous registry analyses, in which time to physiotherapy assessment did not differ significantly across final outcomes, and should be interpreted considering the limited variability in timing and the different recording precision between periods.

More notably, a positive relationship emerged between treatment days and magnitude of improvement, observed across all scales and particularly marked for Barthel and NRS.

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Conceptually, the result is consistent with literature describing dose-response associations between physiotherapy in acute medical care, functional recovery and discharge destination [10]. In the present study, however, treatment days do not represent a randomised dose and may depend on length of stay, baseline severity, diagnosis and recovery potential. This association should therefore be considered exploratory and does not demonstrate a causal effect of greater physiotherapy exposure.

Limitations

The study has the limitations inherent to a single-centre retrospective registry: possible heterogeneity in recording precision; 2026 limited to the first half of the year; approximate mean bed count for 2025; episode-based unit of analysis with repeat admissions; absence of comorbidity data and standardised indicators of clinical severity; rare categories; confounding by indication in analyses of treatment and outcome; and complete-case multivariable analyses based on Barthel. From a managerial perspective, actual hours dedicated to the unit, session duration, indirect activities, other services covered, and physiotherapy need among non-referred patients were unavailable. The 100% completion rate therefore refers to requests received and does not demonstrate complete coverage of need. The literature review was narrative and targeted, without a systematic protocol, double screening or formal risk-of-bias assessment. Observed associations should not be interpreted as causal effects. For the pre-post analyses, additional limitations include the absence of a control group, selection of a subsample with available serial assessments, and potential confounding in the relationship between treatment duration and improvement. T0-T1 changes describe the observed evolution during the care pathway and do not allow the change to be causally attributed to physiotherapy.

Conclusions

Activity per bed/month increased without an increase in resources, documenting growing integration of the service but also vulnerability related to dependence on a single professional and the absence of Sunday and public-holiday coverage. The literature supports the value of mobility and early functional assessment, but does not allow automatic inference of the superiority of a specific staffing model or seven-day coverage. For physiotherapy management, the next step is prospective measurement of need, professional time, treatment dose and demand on uncovered days, in order to estimate staffing requirements and evaluate targeted organisational models. In the subsample with serial assessments, the care pathway was also accompanied by significant improvements in functional and symptom-related outcomes and by a positive relationship between treatment days and magnitude of improvement. This clinical signal complements, without replacing, the main organisational finding of the study and requires confirmation through adjusted analyses and prospective data collection.

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