

Conceptual Foundations of Social Medicine in Rehabilitation: Evolution of Scientific Paradigms and Their Adaptation to Armed Conflict Contexts

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Abstract

Introduction: Since February 2022, the full-scale war in Ukraine has sharply increased the need for rehabilitation and exposed conceptual and organisational weaknesses of the national system.

Objective: To analyse the evolution of conceptual approaches in social medicine related to rehabilitation, identify major paradigm shifts, and propose a framework adapted to wartime conditions in Ukraine.

Methods: This study was designed as a structured conceptual review, combining theoretical, comparative-historical, and contextual analysis of literature and policy documents published between 1948 and 2025, including WHO materials, Cochrane reviews, and Ukrainian regulatory sources. A structured search of four bibliographic databases returned 612 records, from which a focused corpus of foundational, conceptual, and policy sources was synthesised; the study does not constitute a systematic or scoping review.

Results: Five major paradigm shifts were identified: from the biomedical to the biopsychosocial model; from the medical to the social model of disability; from ICIDH to ICF; from empirical to evidence-based rehabilitation; and from paternalistic to patient-centred care. In Ukraine, implementation remains constrained by institutional fragmentation, workforce shortages, and incomplete ICF adoption. An integrative concept of rehabilitation resilience is proposed as the system’s capacity to absorb shocks, adapt, and restore access, quality, and equity of services under armed conflict.

Conclusions: Contemporary rehabilitation should be understood as a medico-social strategy rather than a narrowly clinical intervention. The rehabilitation resilience framework can support evidence-informed policy, organisational reform, and recovery planning in Ukraine.

Keywords: social medicine, rehabilitation, armed conflict, biopsychosocial model, International Classification of Functioning, evidence-based rehabilitation, patient-centred care, Ukraine

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1. Introduction

Rehabilitation, as a process of restoring health, functional capacity, and social participation, occupies a central position in social medicine. Its relevance derives from the link between rehabilitation and the core categories of social medicine: population health, quality of life, medico-social needs, healthcare organisation, accessibility, and equity (Voronenko & Moskalenko, 2022; Porter, 2020). Unlike clinical medicine, social medicine operates at the population level; rehabilitation, by addressing biological, psychological, and social dimensions of recovery, it is therefore a natural object of investigation for social medicine.

The need to re-examine these foundations has been amplified by the armed conflict in Ukraine that escalated to a full-scale invasion in February 2022. The World Health Organisation (WHO) estimates that at least 14.6 million persons in Ukraine require rehabilitation (World Health Organisation, 2025). The conflict has caused destruction of healthcare infrastructure exceeding USD 2.5 billion, displacement of more than 3.5 million internally displaced persons, and severe workforce shortages (Kyiv School of Economics, 2024).

Historically, rehabilitation as a distinct field is inextricably linked with twentieth-century armed conflicts. The First World War catalysed prosthetics, physical therapy, and vocational rehabilitation; the Second World War led Howard A. Rusk to formulate comprehensive rehabilitation integrating medical, vocational, and social components (DeLisa et al., 2021; Anderson, 2020); and Sir Ludwig Guttmann's work at Stoke Mandeville established rehabilitative sport as therapy, eventually inspiring the Paralympic movement (Stiker, 2019). Armed conflict has thus repeatedly catalysed paradigm shifts in rehabilitation.

2. Aim of the article

This article aims to trace the evolution of conceptual approaches in social medicine as applied to rehabilitation, identify the key paradigm shifts defining the contemporary understanding of rehabilitation, examine challenges of paradigm implementation in the Ukrainian context, and propose an integrative framework-rehabilitation resilience, adapted to armed conflict and post-war recovery.

3. Materials and methods

This study was conducted as a structured conceptual review, a design suited to mapping the evolution of ideas and integrating heterogeneous bodies of knowledge into a coherent framework rather than to aggregating effect estimates (Grant & Booth, 2009). The review combined theoretical, comparative-historical, conceptual, and contextual analyses. It was informed by a structured-though deliberately non-exhaustive-literature search and is distinct from a systematic review or a scoping review; it therefore does not claim adherence to PRISMA or PRISMA-ScR reporting standards (Tricco et al., 2018), following instead the conventions of interpretive conceptual synthesis, in which the search sup-

ports, but does not mechanically determine, the analytical argument. Theoretical analysis covered foundational texts from the WHO Constitution (1948) through the ICF (2001) to the Rehabilitation 2030 initiative (2017). Comparative-historical analysis traced paradigm evolution across temporal and geopolitical contexts, with attention to the Soviet and post-Soviet trajectory. Conceptual synthesis integrated the biopsychosocial model, ICF, evidence-based rehabilitation, patient-centredness, health system resilience, and the social determinants framework. Contextual analysis examined the applicability of international approaches to Ukraine, drawing on national legislation, empirical studies, and WHO situational reports.

The literature search covered PubMed, Scopus, Web of Science, and the Cochrane Library, supplemented by WHO policy documents, Verkhovna Rada legislation databases, and Ukrainian periodicals. Search terms combined MeSH and free-text terms: 'social medicine', 'rehabilitation', 'biopsychosocial model', 'ICF', 'evidence-based rehabilitation', 'health system resilience', 'armed conflict', and 'Ukraine'. The review covered publications from 1948 to 2025, with emphasis on the last decade.

To support transparency and reproducibility, the yield of the search and the logic of source selection are reported here, while it is reiterated that the review was not conducted as a systematic or scoping review. The structured search initially returned 612 records. After removal of 137 duplicates, 475 records were screened by title and abstract against predefined relevance criteria, and 108 records were retained for full-text assessment. Sources were considered eligible if they addressed the conceptual foundations, classification, evidence base, or organisation of rehabilitation; the social and medico-social determinants of functioning; or health-system resilience and its application to crisis and conflict settings. Records were excluded if they were narrowly clinical without conceptual relevance, addressed unrelated conditions, or duplicated conceptual content already represented in higher-quality sources. Screening and selection were performed by the authors; consistent with the conceptual aim, sources were selected for their conceptual contribution rather than appraised through a formal risk-of-bias instrument, and neither dual independent screening nor quantitative quality scoring was undertaken. The final corpus synthesised in this review is reflected in the reference list and was complemented by foundational theoretical texts and authoritative WHO and Ukrainian policy and legislative documents identified through citation tracking and purposive searching.

The synthesis proceeded in four explicit analytical steps. First, the retained sources were charted by historical period, conceptual domain, and level of application (individual versus population), and recurring constructs were extracted and grouped thematically. Second, these constructs were examined comparative-historically to locate discontinuities-points at which the dominant conceptualisation of rehabilitation shifted qualitatively rather than merely accumulated. A shift was treated as a distinct paradigm change only when

it was documented across multiple independent sources and entailed a change in underlying assumptions rather than terminology alone. Third, the identified shifts were synthesised to specify their implications for social medicine and for the organisation of services. Fourth, the resulting constructs were integrated into a single analytical framework and tested for internal coherence against the source literature. The findings reported below are the product of this procedure and are referenced throughout to the sources from which they are derived.

4. Results

The following sections report the results of the conceptual synthesis. Each paradigm shift was derived through the analytical procedure described above and is grounded in the cited literature; the accompanying tables (Tables 1-3) consolidate these analytical findings rather than introduce new claims.

4.1. Paradigm shift i: from biomedical to biopsychosocial model

Engel's biopsychosocial model (1977) marked a fundamental departure from the reductionist biomedical paradigm dominant in Western medicine since the seventeenth century (Engel, 1977). It posits that health and illness reflect dynamic interactions among biological factors (genetics, physiology, pathology), psychological factors (cognition, emotion, behaviour, motivation), and social factors (socio-economic status, cultural environment, social support, service accessibility). For rehabilitation, this model provided theoretical grounds for multidisciplinary practice and for considering the full spectrum of recovery determinants (Wade & Halligan, 2017).

Wade and Halligan operationalised the model as a practical clinical tool, identifying four requirements: systematic assessment of all three dimensions; goal-setting across biological, psychological, and social domains; multidisciplinary team engagement; and outcome measures capturing all three dimensions (Wade & Halligan, 2017). For social medicine, the distinction between individual- and population-level applications is crucial: while clinical rehabilitation applies the model to patients, social medicine deploys it at the population level, examining how social conditions shape the prevalence of conditions requiring rehabilitation, the accessibility and effectiveness of services, and outcomes across social groups (Voronenko & Moskalenko, 2022; Slabkiy & Dudina, 2023).

4.2. Paradigm shift ii: from medical to social model of disability

The social model of disability, developed by Oliver and Barnes, asserts that disability arises primarily from social barriers and discrimination rather than individual impairments (Oliver, 2022). It transformed rehabilitation's focus from 'correcting defects' to environmental transformation and barrier elimination, and redirected social medicine's

analytical attention from individual to systemic levels—examining how institutions, policies, legislation, and cultural norms create or remove barriers for persons with disabilities. WHO's adoption of the International Classification of Impairments, Disabilities, and Handicaps (ICIDH) in 1980 conceptualised disease consequences across three levels: impairment, disability, and handicap (World Health Organisation, 1980). Although the linear causal logic of ICIDH was later criticised, it established the principle that rehabilitation must operate across all levels of consequence.

4.3. Paradigm shift iii: from icidh to icf as an operational framework

Adoption of the International Classification of Functioning, Disability and Health (ICF) by the 54th World Health Assembly in 2001 was a genuine revolution in conceptualising rehabilitation (World Health Organisation, 2001). ICF replaced the linear ICIDH with an interactive biopsychosocial framework in which functioning results from dynamic interactions among health conditions, components of functioning (body functions and structures, activities, participation), and contextual factors (environmental and personal). Stucki and colleagues developed ICF Core Sets for stroke, spinal cord injury, chronic pain, and limb amputation, providing instruments for systematic population-level needs assessment (Stucki et al., 2022).

The ICF's 'participation' domain (learning, employment, interpersonal relationships, civic life) directly aligns with social medicine, while its environmental factors component reflects the social determinants of health (Stucki & Bickenbach, 2023). Stucki and Bickenbach proposed 'functioning as the third health indicator' alongside morbidity and mortality, arguing that it should be systematically measured at the system level (Stucki & Bickenbach, 2023). Recognising functioning as a key indicator elevates rehabilitation from auxiliary to strategic priority, with profound implications for health policy and resource allocation.

4.4. Paradigm shift iv: from empirical to evidence-based rehabilitation

Adapting evidence-based medicine to rehabilitation produced evidence-based rehabilitation (EBR), defined as the application of best available scientific evidence, combined with clinical expertise and patient preferences, to inform rehabilitation decisions (Guyatt et al., 1992; Dijkers et al., 2023). EBR is critical for social medicine: it provides a scientific basis for policy, a framework for quality assessment, and standardisation as a prerequisite for equity in access.

Implementation faces specific methodological challenges. Rehabilitation interventions are complex-multi-component, context-dependent, and shaped by patient-professional interactions—and have been characterised as 'personalised, multi-component, context-dependent, and functioning-oriented' (Negrini et al., 2022), necessitating adaptation of the traditional evidence hierarchy. Cochrane Rehabilitation, established in 2016, systematises the evidence base

through reviews and meta-analyses (Negrini et al., 2020). Outcome measurement requires Patient-Reported Outcome Measures (PROMs) and Patient-Reported Experience Measures (PREMs), which capture the multidimensional and subjective nature of rehabilitation results (Black, 2013), with direct implications for how social medicine formulates recommendations on service organisation and financing.

4.5. Paradigm shift v: from paternalistic to patient-centred rehabilitation

The patient-centredness paradigm, theorised by Berwick, Stewart, and others, shifts focus from disease to the person, emphasising individualised needs, preferences, and values (Epstein & Street, 2011). Crossing the Quality Chasm (Institute of Medicine, 2001) identified patient-centredness as one of six essential characteristics of quality health-care. In rehabilitation, this paradigm is especially salient

because rehabilitation goals—return to work, self-care, social participation—are inherently subjective, defined by individual values rather than objective clinical parameters. Shared decision-making (SDM) entails active patient involvement in determining goals and selecting interventions (Elwyn et al., 2012), marking a fundamental departure from the paternalistic post-Soviet tradition. Transition to a partnership model requires systemic changes in standards, protocols, training curricula, and quality assessment—all within the remit of social medicine.

4.6. Contemporary paradigm: the seven defining features

Synthesis of the identified paradigm shifts reveals seven defining features of the contemporary rehabilitation paradigm (Table 1).

Table 1. Seven Defining Features of the Contemporary Rehabilitation Paradigm and Their Implications for Social Medicine

No.	Feature	Key Content	Implications for Social Medicine
1	Rehabilitation as a health strategy (WHO Rehabilitation 2030)	Recognition of rehabilitation as integral to Universal Health Coverage; 2.4 billion people globally need rehabilitation	Elevation from auxiliary to strategic priority; basis for policy advocacy and resource allocation
2	Continuity of rehabilitation process	Seamless transition: acute → early → subacute → ambulatory → community-based	Coordination across facilities and levels; analysis of care pathways
3	Integration into the health system	Rehabilitation embedded at primary, secondary, and tertiary care	Network planning, resource distribution, patient routing across levels
4	Digital transformation and telerehabilitation	Telerehabilitation, mHealth, VR/AR, AI-driven personalisation, robotic systems	Equity implications: digital access, literacy; quality standards for remote services
5	Outcome orientation and accountability	Systematic use of PROMs and PREMs; shift from process to outcome evaluation	Population-level monitoring; evidence base for quality improvement
6	Community-based rehabilitation	CBR/CBID framework; rehabilitation extending beyond institutional settings	Mobilisation of community resources; addressing institutional capacity limits
7	Equity in access	Addressing geographic, socio-economic, gender, age, and conflict-related disparities	Measurement and reduction of inter-regional inequality; targeted interventions

4.7. Social determinants and rehabilitation: dual significance

The WHO Commission on Social Determinants of Health (CSDH), chaired by Michael Marmot, established that the conditions in which people are born, grow, live, work, and

age are the principal determinants of health (Commission on Social Determinants of Health, 2008). For rehabilitation, this framework has dual significance: social determinants influence both the risk of conditions requiring rehabilitation and the accessibility and effectiveness of services. Socio-economic status, education, housing, social support, and

transport infrastructure substantially modify rehabilitation need and effectiveness. Marshall-McKenna et al. (2023) confirmed that lower socio-economic status is associated with poorer outcomes after stroke, orthopaedic surgery, and traumatic brain injury, mediated by limited access to services, less favourable home environments, lower baseline health, reduced social support, and greater stressor exposure. In Ukraine, displacement, loss of housing, disruption of social networks, and economic instability further amplify rehabilitation needs and constrain capacity to address them.

4.8. Health system resilience and rehabilitation under armed conflict

Health system resilience, defined by Kruk et al. as the capacity to ‘prepare for and effectively respond to crises, maintain core functions during crisis, and reorganise with lessons learned while ensuring equitable access’ (Kruk et al., 2015), has gained prominence following the COVID-19 pandemic and amid armed conflicts. Blanchet and col-

leagues distinguished three dimensions: absorption (absorbing shock without significant change), adaptation (adjusting while maintaining core functions), and transformation (qualitative restructuring that enhances future resilience) (Blanchet et al., 2017). These three domains—absorption, adaptation, and transformation—are theoretically derived from health-system resilience scholarship rather than from primary empirical data generated in this study, and they are used here as analytical categories for examining how a rehabilitation system responds to sustained shocks. For Ukraine’s rehabilitation system, resilience requires specific adaptation. The conflict creates a triple challenge: (1) sharp demand increase (combat injuries, mental health disorders, restricted access to routine care); (2) supply contraction (infrastructure destruction, workforce deficit, financial constraints); and (3) increasingly complex operating environment (insecurity, displacement, communication disruptions) (Kyiv School of Economics, 2024). Response capacity depends on prior investments, adaptive mechanisms, and capacity for transformation.

Table 2. Five Paradigm Shifts in the Conceptual Understanding of Rehabilitation Within Social Medicine

No.	Paradigm Shift	From	To	Key Outcome
I	Biopsychosocial transition	Biomedical model: illness as purely biological	Biopsychosocial model: health as bio-psycho-social interaction	Justification of multi-disciplinary rehabilitation
II	Disability reconceptualisation	Medical model: disability as individual deficit	Social model: disability as social construction	Focus on environmental transformation
III	Classification modernisation	ICIDH (1980): linear causal model	ICF (2001): interactive biopsychosocial framework	Standardised operational toolkit for assessment
IV	Evidentiary standards	Empirical practice: authority-based decisions	Evidence-based rehabilitation: best evidence	Scientific basis for policy and quality assurance
V	Patient role transformation	Paternalistic: patient as passive recipient	Patient-centred: patient as active partner	Shared decision-making; subjective goal-setting

4.9. The ukrainian context: legacy, reform, and persistent barriers

Ukraine’s rehabilitation system inherited a Soviet-era model that fundamentally diverged from contemporary international approaches: dominance of the medical model of disability; orientation of medico-social expertise toward establishing disability groups for social payments rather than determining rehabilitation potential; conceptualisation of rehabilitation primarily as sanatorium-resort treatment and physiotherapy; and the patient as a passive object of medical interventions (Lekhan et al., 2023). Since independence in 1991, Ukraine has gradually transitioned toward contempo-

rary approaches. The Law of Ukraine ‘On Rehabilitation in the Sphere of Healthcare’ (December 2020, in force since 2023) established the ICF as the foundation of the rehabilitation process and mandated ICF-based individual rehabilitation plans (Law of Ukraine, 2020).

Implementation, however, faces systemic obstacles: insufficient professional training (only 23% of physicians possess adequate ICF knowledge for application), absence of adapted assessment instruments, limited information systems that do not support ICF coding, and the inertia of a biomedical professional culture (Voronenko et al., 2023). New specialties—physical and rehabilitation medicine physi-

cian, physical therapist, occupational therapist-and training under specialty 227 ‘Physical Therapy, Occupational Therapy’ have been introduced (Ministry of Education and Science of Ukraine, 2018), yet workforce deficits persist: physical therapist staffing is 12.7 per 100,000 population against a normative 25, and occupational therapist staffing is 2.3 per 100,000 against a normative 10. The Rehabilitation Accessibility Index ranges from 0.29 to 0.61 across regions, reflecting profound inter-regional disparities.

Under armed conflict, structural deficiencies are compounded by widespread post-traumatic stress disorder (PTSD), depression, anxiety, and disrupted access to routine care for chronic conditions, while the ‘rehabilitation vacuum’-discontinuation of rehabilitation after discharge-affects 56.3% of patients, underscoring critical failure of care continuity.

Table 3. Components of the “Rehabilitation Resilience” Integrative Framework

Component	Theoretical Source	Role in the Framework
Biopsychosocial model	Engel (1977); Wade & Halligan (2017)	Theoretical foundation for rehabilitation needs across biological, psychological, and social dimensions
ICF	WHO (2001); Stucki et al. (2022)	Operational framework for standardised assessment, planning, and outcome evaluation
Evidence-based rehabilitation	Guyatt et al. (1992); Dijkers et al. (2023)	Quality standard ensuring interventions are guided by best available scientific evidence
Patient-centredness	Institute of Medicine (2001); Elwyn et al. (2012)	Value orientation ensuring respect for individual needs and active patient participation
Health system resilience	Kruk et al. (2015, 2017); Blanchet et al. (2017)	System property enabling absorption, adaptation, and transformation under shocks
Social determinants of health	CSDH / Marmot (2008)	Analytical lens for contextual factors influencing rehabilitation needs and outcomes

Note. The components and their theoretical sources are derived through conceptual integration of established models; the framework is intended as an analytical tool rather than a validated operational instrument, and its indicators require empirical development and validation.

5. Discussion

The five identified paradigm shifts (Table 2)-biopsychosocial transition, disability reconceptualisation, classification modernisation, evidentiary standards reform, and patient role transformation-have collectively transformed rehabilitation from a narrowly medical procedure into a comprehensive medico-social strategy. Translation into practice, particularly in low- and middle-income countries and conflict-affected settings, remains challenging.

The Ukrainian case illustrates a critical tension between paradigm adoption and institutional capacity. While legislative and normative frameworks have progressively incorporated contemporary paradigms-most notably through the 2020 Rehabilitation Law and ICF adoption-operational infrastructure, workforce, and professional culture continue to reflect legacy models. This finding aligns with the broader

literature on health system reform in post-Soviet states, where formal policy changes frequently outpace substantive institutional transformation (Lekhan et al., 2023; Rechel et al., 2014).

The ‘rehabilitation resilience’ concept proposed here addresses a critical gap. While health system resilience has been extensively theorised (Kruk et al., 2015; Blanchet et al., 2017), its application to rehabilitation under protracted armed conflict has received insufficient attention. Ukraine’s triple challenge requires a tailored framework integrating multiple theoretical perspectives. Rehabilitation resilience is defined as the capacity of the rehabilitation care system to maintain and restore its ability to meet medico-social rehabilitation needs of the population under external shocks, while ensuring accessibility, quality, and equity of services. It integrates: (a) the biopsychosocial model as theoretical foundation; (b) ICF as operational framework; (c) EBR as

quality standard; (d) patient-centredness as value orientation; (e) resilience theory as system property; and (f) the social determinants framework as analytical lens. The framework is advanced as an analytical and heuristic tool for structuring inquiry, policy reasoning, and reform planning, rather than as a validated operational or predictive model. Its constituent domains are theoretically derived through integration of established models, and any indicators associated with them—including those proposed below for future development—are illustrative rather than empirically validated; their measurement properties, thresholds, and predictive value remain to be established. Operationalisation and empirical testing are accordingly identified as priorities for subsequent research.

Several implications follow. First, integration of rehabilitation into universal health coverage, advocated by WHO Rehabilitation 2030, must be operationalised through concrete financing—Ukraine’s rehabilitation spending of 0.28% of GDP is significantly below the European average of 0.5–0.8%. Second, the workforce crisis requires both quantitative expansion and qualitative transformation through curricula embedding the biopsychosocial model, ICF, and evidence-based practice. Third, digital transformation—particularly telerehabilitation—offers a pathway to address access barriers in conflict-affected areas, although it raises equity concerns regarding digital literacy and connectivity. Fourth, measurement infrastructure must shift from process indicators to outcome indicators (functional improvement and quality of life gains), leveraging PROMs as integral evaluation tools.

5.1. Limitations of the study

This study has several limitations. As a structured conceptual review rather than a systematic or scoping review, it did not employ an exhaustive search, dual independent screening, or formal quality appraisal of included sources; selection therefore reflects the authors’ conceptual judgement and carries an attendant risk of selection bias. The proposed rehabilitation resilience framework has been elaborated theoretically and requires empirical validation. The Ukrainian focus may limit direct applicability of certain findings to other conflict-affected settings, although the broader paradigmatic analysis retains general relevance. Some empirical figures may also require periodic updating as the conflict and reconstruction efforts continue.

5.2. Future research

Future research should empirically validate the rehabilitation resilience concept through multi-site studies in conflict-affected regions, develop measurable indicators for its operationalisation (covering absorption, adaptation, and transformation), and undertake comparative analyses across diverse conflict and post-conflict contexts. Longitudinal studies of ICF implementation in Ukraine, evaluations of telerehabilitation effectiveness in displaced populations, and assessments of community-based rehabilitation models for

veterans and civilians with combat-related injuries are particularly warranted.

6. Conclusions

This analysis identified five paradigm shifts that have fundamentally transformed the theoretical understanding of rehabilitation: from biomedical to biopsychosocial model; from medical to social model of disability; from ICIDH to ICF; from empirical to evidence-based rehabilitation; and from paternalistic to patient-centred care. Collectively, they reposition rehabilitation from a narrowly medical procedure into a comprehensive medico-social strategy embedded within health systems. The contemporary paradigm is characterised by seven defining features—recognition as a health strategy, continuity of process, integration into the health system at all levels, digital transformation, outcome orientation, community-based approaches, and equity in access—each carrying specific implications for the organisation and governance of rehabilitation services.

The Ukrainian context reveals a fundamental disconnect between progressive legislative adoption of contemporary paradigms and the persistent legacy of Soviet-era institutional structures. The armed conflict has simultaneously amplified rehabilitation needs (4.2–4.8 million persons, 11–13% of the population) and depleted system capacity. The proposed ‘rehabilitation resilience’ concept—integrating the biopsychosocial model, ICF, evidence-based rehabilitation, patient-centredness, resilience theory, and the social determinants approach—offers a foundation for evidence-informed policy, organisational reform, workforce strategy, and resource allocation in Ukraine’s rehabilitation system.

Conflict of interests

The authors declare no conflicts of interest.

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