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APPLYING THE FLAG SYSTEM WITHIN A BIOPSYCHOSOCIAL FRAMEWORK: A CASE SERIES IN PHYSIOTHERAPY PRACTICE

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Abstract

Musculoskeletal pain represents a leading cause of disability and functional limitation, requiring assessment approaches that extend beyond a purely biomedical perspective. Contemporary physiotherapy increasingly adopts the biopsychosocial model, which acknowledges the interaction between biological, psychological, occupational, and social factors influencing pain and recovery. Within this context, the flag system provides a structured framework for identifying multidimensional risk factors associated with pain chronicity and delayed rehabilitation.

The purpose of this article is to illustrate the clinical application of the flag system in physiotherapy practice through a series of representative clinical cases. A descriptive case series methodology was employed, including three anonymized cases commonly encountered in musculoskeletal and occupational rehabilitation. Each case was assessed using structured screening for red, yellow, orange, blue, and black flags, guiding clinical reasoning and individualized intervention planning.

The results demonstrate that functional limitations and delayed recovery were more strongly associated with psychosocial, occupational, and systemic factors than with physical impairment alone. The identification of relevant flags supported targeted interventions, interdisciplinary collaboration, and appropriate referral when necessary.

In conclusion, the case series highlights the practical value of integrating the flag system within a biopsychosocial framework. This approach enhances clinical decision-making, supports personalized care, and may contribute to the prevention of pain chronicity in physiotherapy practice.

Introduction

Musculoskeletal pain represents a major cause of disability and work-related functional limitation worldwide, with a substantial impact on individuals, healthcare systems, and socio-economic outcomes [1,2,3]. Although many musculoskeletal conditions show favorable structural recovery, a significant proportion of patients develop persistent pain and disability that cannot be fully explained by tissue

pathology alone. Clinical and epidemiological evidence has demonstrated that similar structural findings may be associated with markedly different pain experiences and recovery trajectories, highlighting the limitations of a purely biomedical approach [2,4].

In response to these challenges, contemporary rehabilitation has increasingly adopted the biopsychosocial model, which conceptualizes pain as the result of complex interactions between biological, psychological, and social factors. This model provides a comprehensive framework for understanding pain persistence, disability, and barriers to recovery, emphasizing the importance of contextual determinants of health. Within physiotherapy practice, the biopsychosocial model supports clinical reasoning that extends beyond symptom reduction toward functional recovery and participation [3,4,6,12].

The flag system was developed as a practical clinical tool to operationalize the biopsychosocial model in musculoskeletal care. Initially introduced through clinical guidelines for low back pain management, the system aimed to facilitate early identification of risk factors associated with delayed recovery and chronic disability. Over time, the framework expanded to include multiple categories of flags addressing biological, psychological, occupational, and systemic influences on health outcomes [4,7,8].

Among these categories, blue flags refer specifically to patients' perceptions and beliefs related to work and its relationship to pain and disability. These include beliefs that work is harmful, fear of reinjury, occupational stress, low job satisfaction, and perceived lack of managerial support. Evidence consistently shows that such work-related beliefs can act as significant barriers to recovery, being associated with prolonged work absence, reduced engagement in rehabilitation, and delayed return to work, independent of physical impairment severity [5,8,9].

Identification of blue flags requires a structured occupational assessment combining standardized screening tools with a focused occupational interview. Instruments such as the Örebro Musculoskeletal Pain Questionnaire include items addressing work perception, activity limitations, and expectations of recovery, supporting early identification of patients at risk of pain chronicity. Similarly, the STarT Back Screening Tool facilitates risk stratification by incorporating psychosocial and functional dimensions relevant to occupational participation. In addition, occupational stress assessment models, including the Job Content Questionnaire and the Effort–Reward Imbalance model, provide valuable insights into the relationship between job demands, control, and perceived rewards, further contextualizing work-related risk factors [1,2,9,10].

Beyond physical rehabilitation, the role of the physiotherapist encompasses patient education, promotion of self-efficacy, ergonomic guidance, and adaptation of interventions to occupational demands. Early recognition of occupational and systemic barriers, such as rigid workplace policies, inadequate ergonomic resources,

or limited access to vocational rehabilitation, allows the development of individualized strategies aimed at preventing pain chronicity and long-term disability [4,6,8,11].

Therefore, integrating occupational assessment and blue flag identification into physiotherapy practice represents a core component of a biopsychosocial approach to musculoskeletal pain. Such integration supports not only functional recovery but also safe and sustainable return to work, contributing to improved participation outcomes and quality of life for patients with musculoskeletal conditions [3,4,12].

Material-method

The aim of this study was to examine the practical application of the biopsychosocial flag system in physiotherapy assessment and clinical decision-making, with a particular focus on identifying multidimensional risk factors associated with musculoskeletal pain and delayed recovery. A descriptive case series design was adopted. Three representative clinical cases commonly encountered in physiotherapy practice were selected to illustrate the application of red, yellow, orange, blue, and black flags within a biopsychosocial framework. All cases were anonymized, and no identifiable personal data were included. Each case underwent a structured assessment process comprising clinical history, physical examination, and biopsychosocial screening. Red flags were screened to exclude serious pathology requiring medical referral. Psychological, occupational, and social risk factors were identified using structured clinical interviews and validated screening tools.

The Örebro Musculoskeletal Pain Questionnaire (OMPQ) and the STarT Back Screening Tool were used to assess psychosocial risk factors, fear avoidance beliefs, and perceived impact of pain on daily activities and work participation. Occupational factors were explored through a semi-structured work-focused interview addressing job demands, workplace support, and perceived barriers to return to work. No specialized technical equipment or medical devices were required for this analysis. Interventions were planned according to physiotherapy clinical reasoning principles, including patient education, graded exercise programs, ergonomic recommendations, and interdisciplinary referral when indicated. Data analysis consisted of qualitative synthesis and comparative interpretation of the clinical findings across cases, with the objective of illustrating how flag-based assessment informs individualized, patient-centered physiotherapy management.

Results

The application of the biopsychosocial model and the flag system across the analyzed clinical scenarios highlights the relevance of multidimensional assessment in physiotherapy practice. The results are presented as an illustrative clinical case series, demonstrating how biological, psychological, occupational, and systemic

factors interact to influence pain persistence, functional limitation, and return to activity.

Case 1 – Chronic low back pain with occupational and psychosocial factors

A 42-year-old male office worker presented with recurrent low back pain persisting for six months. No red flags were identified, and clinical examination did not suggest serious pathology. However, yellow flags were evident, including fear of movement and catastrophizing beliefs related to lumbar flexion. From an occupational perspective, the patient perceived prolonged sitting and desk work as harmful and reported limited managerial understanding, consistent with blue flags. Additionally, restricted access to ergonomic equipment due to workplace policies indicated the presence of black flags.

Within the biopsychosocial framework, pain persistence in this case was primarily associated with psychosocial and occupational factors rather than physical impairment. A flag-informed intervention focused on pain education, graded exposure to lumbar flexion, ergonomic recommendations, and collaboration with occupational health services to address workplace barriers.

Case 2 – Tension-type headache with psychological and occupational stressors

A 29-year-old female teacher reported chronic tension-type headache lasting over one year, associated with high occupational stress and prolonged static posture. Screening excluded red flags, as no neurological warning signs were present. Yellow flags included anxiety, sleep disturbances, and catastrophic interpretations of pain. Orange flags were identified in the form of moderate depressive symptoms and social withdrawal. Blue flags were also present, as the patient perceived the work environment and performance pressure as primary contributors to symptoms.

This case illustrates how overlapping yellow, orange, and blue flags can sustain pain in the absence of structural pathology. Management required an interdisciplinary, biopsychosocial approach, combining physiotherapy interventions (postural training and cervical exercises), psychological referral for cognitive-behavioral therapy, and occupational adjustments to reduce workload and improve recovery opportunities.

Case 3 – Barriers to occupational reintegration following musculoskeletal injury

A 43-year-old construction worker presented after near-complete physical recovery from a knee injury but refused to return to work. No red flags were identified, and functional assessment indicated sufficient strength and mobility. Yellow flags included intense fear of reinjury and low self-efficacy. Blue flags were

evident through the belief that physical work was no longer feasible, while black flags were identified due to the absence of graded return-to-work policies and rigid occupational regulations.

Despite favorable physical recovery, vocational reintegration was primarily limited by psychosocial and systemic barriers. Intervention focused on functional task-specific exercises, education to address fear avoidance, collaboration with occupational medicine for graded return-to-work planning, and patient advocacy regarding available legal and occupational resources.

Across all three cases, functional limitation and delayed recovery were more strongly associated with psychosocial, occupational, and systemic factors than with biological impairment alone. The structured application of the flag system facilitated identification of relevant risk factors, guided individualized intervention strategies, and supported interdisciplinary collaboration. These findings underscore the clinical utility of integrating biopsychosocial assessment and flag-based screening into routine physiotherapy practice.

Discussions

The findings of this study are consistent with existing literature emphasizing the necessity of a biopsychosocial approach in the assessment and management of musculoskeletal pain. The results confirm that the flag system represents an effective clinical framework for identifying multidimensional risk factors that influence pain persistence, disability, and delayed recovery, beyond structural or biomechanical impairment alone [3,4,7].

Similar to previous studies, the present analysis highlights the critical role of red flag screening in ensuring patient safety and appropriate referral. Early identification of serious pathology remains a fundamental responsibility of physiotherapists and aligns with international clinical guidelines that stress the importance of excluding conditions such as infection, fracture, malignancy, or severe neurological compromise prior to initiating conservative treatment [3,11,12]. The findings therefore support existing evidence that red flag assessment is essential for ethical, legal, and clinical decision-making.

The prominence of yellow flags observed in the analyzed cases corroborates earlier research demonstrating that psychological factors such as fear of movement, catastrophizing, and maladaptive beliefs are strong predictors of pain chronicity and disability. These findings are in agreement with the fear-avoidance model and support the integration of patient education and graded activity into physiotherapy interventions [6,7].

Furthermore, the results emphasize the relevance of blue and black flags, which extend assessment beyond the individual to occupational and systemic contexts. Consistent with previous studies, negative work-related beliefs, lack of

managerial support, and organizational constraints were shown to significantly influence rehabilitation outcomes and return-to-work trajectories, independent of physical recovery [4,5,8]. This supports the hypothesis that successful rehabilitation requires collaboration with occupational health services and recognition of external barriers to recovery. The inclusion of illustrative clinical cases strengthens the practical relevance of the findings by demonstrating how the flag system can be applied in real-world physiotherapy settings. However, the study has several limitations. As a narrative case-based analysis, it does not provide quantitative data or statistical comparisons, and the findings cannot be generalized to all patient populations. Future research should include controlled and longitudinal studies to evaluate the effectiveness of flag-based screening in improving clinical outcomes and reducing long-term disability.

Overall, the results confirm the hypothesis that the flag system effectively operationalizes the biopsychosocial model in physiotherapy practice and represents a valuable tool for comprehensive, patient-centered care.

Conclusions

This article highlights the clinical relevance of the flag system as an effective framework for the assessment and management of musculoskeletal pain within physiotherapy practice. By integrating biological, psychological, occupational, and systemic dimensions, the flag system supports a comprehensive understanding of pain and its potential progression toward chronicity, in line with contemporary biopsychosocial principles.

The analysis of representative clinical cases demonstrates that functional disability and delayed recovery are often influenced more by psychosocial, occupational, and contextual factors than by physical impairment alone. Early identification of red flags remains essential to ensure patient safety and appropriate medical referral, while systematic screening for yellow, orange, blue, and black flags enhances clinical reasoning and individualized treatment planning.

The findings emphasize the importance of interdisciplinary collaboration in the management of complex pain presentations, particularly in cases involving overlapping psychological distress, workplace-related barriers, and systemic constraints. Physiotherapists play a key role not only in physical rehabilitation but also in recognizing limits of practice, facilitating communication among professionals, and supporting patient education and return-to-work strategies.

Future research should focus on quantitative studies evaluating the impact of flag-based screening on clinical outcomes, return-to-work rates, and long-term disability prevention. Additionally, further investigation into standardized training and implementation strategies may strengthen the integration of the flag system into routine physiotherapy practice.

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