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Post-dialysis fatigue in adults receiving maintenance haemodialysis: A systematic review protocol with an integrated concept analysis

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deandalucia.es**Author Affiliation:**Department of Nephrology. Hospital
Universitario Torrecárdenas Almería.**ADMINISTRATIVE INFORMATION****Support** - This study has no sources of financial support.**Review Stage at time of this submission** - Preliminary searches.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202680100**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 28 August 2026 and was last updated on 28 August 2026.**INTRODUCTION****Review question / Objective** Review question:

How has post-dialysis fatigue been defined, characterised, experienced and measured in adults receiving maintenance haemodialysis, and which defining attributes, antecedents, consequences and empirical referents can be identified through a systematic synthesis of the available evidence?

Objective:

The primary objective of this review is to systematically identify, critically appraise and synthesise the available evidence describing post-dialysis fatigue in adults receiving maintenance haemodialysis and, using the Walker and Avant concept analysis framework, to clarify its defining attributes, antecedents, consequences and empirical referents.

A secondary objective is to distinguish post-dialysis fatigue from neighbouring or overlapping constructs, particularly general or chronic haemodialysis-related fatigue, intradialytic fatigue,

dialysis recovery time and the emerging concept of post-dialysis syndrome, thereby providing a conceptual foundation for clinically meaningful assessment and future measurement development.

A supplementary conceptual comparison with post-exertional malaise/post-exertional symptom exacerbation in ME/CFS and Long COVID will be undertaken. This literature will be analysed separately from the primary haemodialysis evidence and used only to support conceptual comparison, without assuming clinical or pathophysiological equivalence with post-dialysis fatigue.

Rationale Post-dialysis fatigue (PDF) is a frequent and burdensome patient-reported phenomenon among people receiving maintenance haemodialysis. However, substantial heterogeneity exists in its definition, temporal delimitation and measurement, and its conceptual boundaries with general haemodialysis-related fatigue and dialysis recovery time remain unclear.

Previous systematic and scoping reviews have examined the prevalence, associated factors, patient experience and measurement of PDF, and a previous concept analysis has identified potential attributes, antecedents and consequences. Nevertheless, recent evidence and the emergence of related constructs such as post-dialysis syndrome indicate that important conceptual uncertainty remains.

A clear conceptual definition is necessary to determine what should be measured, distinguish PDF from neighbouring constructs and support the selection or future development of clinically meaningful assessment instruments.

This review will therefore systematically identify and critically appraise the available evidence and integrate the findings using the Walker and Avant concept analysis framework to clarify the defining attributes, antecedents, consequences and empirical referents of PDF.

Condition being studied PDF is a patient-reported phenomenon occurring in temporal association with haemodialysis treatment. The emerging construct of post-dialysis syndrome will be considered as a neighbouring concept because recent evidence has questioned whether the conventional term PDF adequately represents the broader post-treatment symptom experience.

However, no operational definition will be imposed as the definitive definition at the beginning of this review because establishing the conceptual boundaries of PDF is itself one of the objectives of the study. For study identification purposes only, PDF will be provisionally understood as fatigue that develops, becomes more intense or is specifically experienced during the period following a haemodialysis session

The review will examine how this phenomenon has been defined and distinguished from general or persistent fatigue, intradialytic fatigue and dialysis recovery time. In particular, dialysis recovery time will not be assumed a priori to constitute either PDF itself or one of its defining attributes. The evidence will determine whether recovery time is more appropriately interpreted as a defining attribute, consequence, empirical referent, proxy measure or related but distinct construct.

METHODS

Search strategy A sensitive systematic literature search will be conducted in MEDLINE via PubMed, Scopus and Web of Science Core Collection. Each database will be searched from inception to the date of the final search. No publication-date restriction will be applied to the primary systematic review. The searches will be designed to retrieve

publications explicitly using the terms “post-dialysis fatigue”, “postdialysis fatigue” or equivalent terminology, while also identifying studies in which fatigue or recovery is described specifically in relation to the period following haemodialysis. The strategy will combine controlled vocabulary, where available, with free-text terms related to haemodialysis ("Renal Dialysis"[Mesh] OR "hemodiafiltration" [Mesh] OR "hemodialysis" [tiab] OR "haemodialysis" [tiab] OR "maintenance hemodialysis"[tiab] OR "maintenance haemodialysis"[tiab] OR "hemodiafiltration" [tiab] OR "haemodiafiltration" [tiab]), fatigue ("Fatigue"[Mesh] OR "fatigue" [tiab] OR "fatigability" [tiab] OR "tiredness" [tiab] OR "exhaustion" [tiab] OR "asthenia" [tiab]), post-dialysis fatigue ("Postdialysis" [tiab] OR "post-dialysis"[tiab] OR "post dialysis"[tiab] OR "posthemodialysis" [tiab] OR "post-hemodialysis"[tiab] OR "post hemodialysis"[tiab] OR "posthaemodialysis" [tiab] OR "post-haemodialysis"[tiab] OR "after dialysis"[tiab] OR "after hemodialysis"[tiab] OR "after haemodialysis"[tiab] OR "peridialytic" [tiab] OR "peri-dialytic"[tiab]); and specific post-dialysis constructs ("dialysis recovery time"[tiab] OR "postdialysis recovery"[tiab] OR "post-dialysis recovery"[tiab] OR "post dialysis recovery"[tiab] OR "time to recovery"[tiab] OR "minutes to recovery"[tiab] OR "recovery after dialysis"[tiab] OR "recovery after hemodialysis"[tiab] OR "recovery after haemodialysis"[tiab] OR "postdialysis syndrome"[tiab] OR "post-dialysis syndrome"[tiab] OR "post dialysis syndrome"[tiab]).

The search syntax will be adapted to the indexing and technical requirements of each database. Complete reproducible strategies, including database platform, date of execution and number of records retrieved, will be reported in the final manuscript and are provisionally presented in Annex 1.

Electronic searching will be complemented by backward reference-list screening of included studies and relevant systematic or scoping reviews. Forward citation searching will also be undertaken for key seminal and eligible studies in order to identify additional publications not retrieved through database searching. A conceptual search will examine literature concerning post-exertional malaise or post-exertional symptom exacerbation in ME/CFS and Long COVID. This supplementary corpus will not be incorporated into the primary search strategy. Instead, it will be used exclusively during the Walker and Avant analysis to explore whether characteristics such as delayed symptom exacerbation, persistence and recovery trajectories

provide useful conceptual contrasts. Evidence from these conditions will not be considered evidence of clinical equivalence or shared pathophysiology with PDF.

Participant or population The primary review will include studies involving adults aged 18 years or older receiving maintenance haemodialysis or haemodiafiltration for kidney failure. Maintenance haemodialysis will be understood as scheduled haemodialysis prescribed as ongoing kidney replacement therapy. No minimum dialysis vintage will be required, as the aim of the review is to characterise post-dialysis fatigue across the maintenance haemodialysis trajectory rather than to restrict the concept to patients with an established duration of treatment. Dialysis vintage will therefore be extracted, where reported, and considered when interpreting potential differences in the definition, manifestations and recovery patterns of post-dialysis fatigue.

Studies enrolling mixed kidney replacement therapy populations will be eligible when data relating specifically to adults receiving maintenance haemodialysis or haemodiafiltration can be separately identified or extracted. Studies exclusively involving paediatric or adolescent populations, patients receiving dialysis for acute kidney injury, individuals treated exclusively with peritoneal dialysis, or kidney transplant recipients without separately identifiable haemodialysis data will be excluded. No restrictions will be imposed according to sex, ethnicity, geographical location, vascular access or dialysis setting.

Intervention Not applicable. The review does not evaluate the effectiveness of a predefined intervention. Intervention studies will be eligible only when they provide information relevant to the definition, characteristics or measurement of PDF.

Comparator Not applicable. No comparator is required to address the primary review question. Comparisons reported within eligible studies, such as post-dialysis versus non-dialysis periods or patients with versus without PDF, will be extracted when they contribute to conceptual clarification.

Study designs to be included The primary evidence corpus will comprise peer-reviewed empirical studies providing information relevant to the conceptualisation, clinical characterisation or measurement of post-dialysis fatigue (PDF). Eligible designs may include cross-sectional studies, prospective and retrospective cohort studies, case-control studies, randomised controlled trials, non-randomised intervention studies, qualitative studies, mixed-methods

research, and studies involving the development, adaptation or validation of instruments specifically relevant to PDF.

Eligibility criteria Studies will be considered eligible when they explicitly describe, define, assess or measure fatigue occurring or worsening after haemodialysis, or when they provide relevant information regarding its temporal, clinical, experiential or measurement characteristics. Studies examining dialysis recovery time may also be included when recovery is explicitly linked to fatigue or post-dialysis symptom burden. Likewise, studies addressing the emerging construct of post-dialysis syndrome may be eligible when they provide information that contributes to defining, distinguishing or contextualising PDF, particularly regarding the relationship between fatigue and other post-dialysis physical, cognitive, emotional or functional manifestations. Evidence concerning post-dialysis syndrome will not be assumed to represent PDF and will be analysed as a related construct when appropriate.

Instrument development, adaptation or validation studies will be included when the instrument is specifically intended to assess PDF or when its measurement properties provide relevant information regarding empirical referents of the construct. Studies evaluating broader fatigue instruments may also contribute when post-dialysis fatigue is separately identifiable or when their findings inform the distinction between PDF and more general forms of fatigue in people receiving haemodialysis. Conceptually relevant information may include terminology and definitions, symptom onset, temporal relationship with haemodialysis, duration, frequency and severity, physical and cognitive manifestations, emotional or psychological characteristics, functional and social consequences, perceived recovery, proposed antecedents and consequences, empirical indicators, patient-reported outcome measures and measurement properties. Information contributing to the conceptual distinction between PDF, general or chronic haemodialysis-related fatigue, intradialytic fatigue, dialysis recovery time and post-dialysis syndrome will also be considered relevant.

Studies focusing exclusively on general fatigue in haemodialysis will be excluded when no post-dialysis component can be distinguished. Similarly, studies assessing fatigue exclusively before or during dialysis will not be included unless post-dialysis information is also reported. Publications examining dialysis recovery time without any conceptual, symptomatic or measurement relationship with fatigue or post-dialysis symptom

burden will be excluded. Studies addressing post-dialysis syndrome will also be excluded when they provide no identifiable information relevant to fatigue or to the conceptual boundaries of PDF. Conference abstracts without a corresponding full report, study protocols, editorials, letters without substantive empirical or conceptual content, and other publications providing insufficient information for eligibility assessment will not form part of the primary empirical corpus. Systematic reviews, scoping reviews, narrative reviews and conceptual or theoretical papers will not be treated as independent primary empirical evidence. However, relevant secondary and conceptual sources will be retained in a separate contextual corpus because they may contribute to the identification of terminology, previously proposed conceptual definitions, related constructs and potentially relevant primary studies. They may also inform comparison with previous conceptual interpretations of PDF. Maintaining these sources separately from the primary empirical corpus will minimise the risk of double counting evidence already represented by their underlying primary studies.

Information sources MEDLINE via PubMed, Scopus and Web of Science Core Collection will be searched from inception to the date of the final search. Backward reference searching and forward citation tracking will be conducted for eligible studies and key seminal publications. Reference lists of previous systematic, scoping and conceptual reviews will also be examined to identify additional eligible primary studies. INPLASY and PROSPERO will be searched for ongoing or completed evidence syntheses addressing the same or closely related questions.

Main outcome(s) The primary outcome will be an evidence-informed conceptual definition of post-dialysis fatigue and the identification of its defining attributes according to the Walker and Avant framework. No fixed post-dialysis assessment interval or measurement scale will be prespecified because the temporal boundaries and empirical indicators of the phenomenon constitute part of the construct under investigation.

Additional outcomes: Additional conceptual outcomes will include the terminology and uses of the concept, antecedents, consequences and empirical referents; temporal onset, duration and recovery trajectory; physical, cognitive, emotional, functional and social manifestations; measurement approaches and measurement properties; and the conceptual relationship between post-dialysis fatigue, dialysis recovery time, general

haemodialysis-related fatigue, intradialytic fatigue and post-dialysis syndrome. Model, borderline, related and contrary cases will also be developed according to the Walker and Avant framework.

Data management All records retrieved from the bibliographic databases will be imported into Mendeley and deduplicated before screening. LM-M and IB-M will independently screen titles and abstracts and subsequently assess the full text of potentially eligible publications. Disagreements will be resolved through discussion and, when necessary, by consultation with MAR-C. Reasons for exclusion at the full-text stage will be recorded, and the selection process will be reported using a PRISMA 2020 flow diagram. A structured data extraction matrix will be developed and piloted before formal extraction. Bibliographic, methodological and descriptive characteristics will be extracted by LM-M and verified by IB-M, whereas data directly informing the concept analysis, including definitions, potential defining attributes, antecedents, consequences and empirical referents, will be independently coded by both reviewers. Disagreements will be resolved by consensus, with MAR-C acting as a third reviewer when required. The extraction matrix will include publication and study characteristics, participant characteristics, dialysis modality and vintage, treatment frequency and duration, terminology used to describe post-dialysis fatigue, explicit or implicit definitions, timing of assessment, symptom onset, duration, frequency and intensity, recovery patterns, clinical and patient-reported factors, and physical, cognitive, emotional, functional and social manifestations. Dialysis vintage will be considered when interpreting potential differences in the characteristics or recovery patterns of the phenomenon.

Information concerning related constructs, including general or chronic haemodialysis-related fatigue, intradialytic fatigue, dialysis recovery time and post-dialysis syndrome, will be extracted when relevant to conceptual discrimination. These constructs will not be assumed to be equivalent to post-dialysis fatigue but will be examined in relation to its defining attributes, antecedents, consequences and empirical referents. When measurement instruments or single-item questions are used, their scoring, recall period, timing of administration and available measurement properties will be recorded. For qualitative studies, relevant participant accounts and authors' interpretations will be extracted. Reports arising from the same or overlapping study populations will be linked to avoid duplicate representation of findings. Secondary and conceptual publications will be maintained separately from the primary

empirical corpus and will not be counted as independent empirical support when their underlying studies are already represented.

Quality assessment / Risk of bias analysis The methodological quality of eligible primary empirical studies will be independently assessed by LM-M and IB-M using the Mixed Methods Appraisal Tool (MMAT), applying the criteria corresponding to each eligible study design. Studies specifically evaluating the measurement properties of patient-reported outcome measures will additionally be assessed using the relevant COSMIN Risk of Bias criteria. Disagreements between reviewers will be resolved through discussion and consensus, with MAR-C acting as a third reviewer when required. Methodological appraisal will not be used as an eligibility criterion, given the conceptual purpose of the review. Instead, appraisal findings will inform interpretation of the strength and credibility of the evidence supporting proposed defining attributes, antecedents, consequences and empirical referents. Findings supported predominantly by studies with important methodological limitations will be interpreted cautiously and identified as provisional where appropriate.

Strategy of data synthesis No quantitative meta-analysis is planned, as the primary purpose of the review is conceptual clarification rather than statistical estimation. Included studies will first undergo a structured descriptive synthesis addressing terminology, definitions, temporal characteristics, manifestations, recovery patterns, associated factors and consequences, and measurement approaches relevant to post-dialysis fatigue (PDF). Descriptive frequencies may be reported where informative, but frequency of reporting alone will not determine conceptual importance.

Following this synthesis, LM-M and IB-M will independently conduct an iterative concept analysis informed by the Walker and Avant framework. Relevant information will first be coded and compared across studies to identify recurring characteristics, conceptual differences, areas of overlap and potentially discriminative features. Findings will subsequently be organised into uses of the concept, defining attributes, antecedents, consequences and empirical referents. Disagreements in coding or conceptual classification will be resolved by consensus, with MAR-C acting as a third reviewer when required. Potential defining attributes will be evaluated according to their recurrence across the evidence, conceptual relevance to the post-dialysis phenomenon, ability to distinguish PDF from

neighbouring constructs, and the methodological credibility of the supporting evidence. Classification will remain iterative and may be reconsidered as evidence is compared. Dialysis recovery time and other related constructs will not be assigned a predetermined conceptual role but will be classified according to the findings of the analysis.

Once the defining attributes have been established, model, borderline, related and contrary cases will be constructed to support conceptual delimitation. These will be hypothetical composite cases and will not represent identifiable patients.

Literature concerning post-exertional malaise/post-exertional symptom exacerbation in ME/CFS and Long COVID will be examined only after the initial conceptual structure of PDF has been derived from the haemodialysis evidence. This supplementary corpus will be used solely for conceptual comparison, and characteristics identified in these conditions will not be incorporated into the definition of PDF unless independently supported by the haemodialysis evidence.

The final synthesis will integrate antecedents, defining attributes, consequences and empirical referents into a coherent conceptual representation of PDF, without inferring causal relationships where these are not supported by the available evidence.

Subgroup analysis No formal statistical subgroup analysis is planned. Where the quantity and nature of the evidence permit, descriptive conceptual comparisons will explore whether definitions, manifestations or measurement approaches differ according to dialysis modality, treatment frequency or duration, dialysis setting, dialysis vintage, study design or instrument used to assess PDF. These comparisons will remain exploratory and will not be interpreted as tests of treatment-effect modification.

Sensitivity analysis Although no conventional quantitative sensitivity analysis will be undertaken, the robustness of the conceptual findings will be explored through alternative interpretations of the evidence corpus. Particular attention will be given to whether the proposed defining attributes remain stable when analysis is restricted to primary empirical studies, when only studies explicitly defining or directly measuring PDF are considered, and when studies presenting substantial unresolved methodological concerns are removed from consideration. Attributes supported predominantly by a limited number of

methodologically uncertain studies will be identified as provisional.

Language restriction Only studies published in English or Spanish will be included, as these are the languages that can be reliably assessed by the review team. No other language restrictions will be.

Country(ies) involved Spain.

Keywords Post-dialysis fatigue; haemodialysis; dialysis recovery time; fatigue; concept analysis; Walker and Avant; patient-reported outcome measures; symptom assessment.

Contributions of each author

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