

INPLASY

INPLASY2026100060

doi: 10.37766/inplasy2026.10.0060

Received: 12 October 2026

Published: 13 October 2026

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Prognostic value of C-reactive protein for complications in major burn patients: a systematic review

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ADMINISTRATIVE INFORMATION

Support - No support.

Review Stage at time of this submission - Risk of bias assessment.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2026100060

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 13 October 2026 and was last updated on 13 October 2026.

INTRODUCTION

Review question / Objective The aim of this systematic review is to evaluate the prognostic value of C-reactive protein (CRP) levels for the development of complications in major burn patients.

Primary question (PECO):

In major burn patients (P), are elevated CRP levels (E) compared with lower CRP levels (C) associated with an increased risk of complications (O: infection, sepsis, multiorgan failure, mortality, prolonged hospital stay, or other clinical complications)?

Rationale Severe burns trigger a profound systemic inflammatory response that often progresses to sepsis, multiple organ failure, and death. C-reactive protein is an acute-phase reactant that rises rapidly following injury. Although C-reactive protein is routinely measured in burn units, its specific role as a prognostic biomarker for complications remains uncertain. Therefore, a systematic synthesis of the available evidence is

proposed to determine whether C-reactive protein (or its trajectory) can identify the risk of complications and guide clinical decision-making in patients with severe burns.

Condition being studied Severe burns are defined as those affecting a significant percentage of the total body surface area (TBSA), deep burns, or burns requiring specialized care in a burn unit or intensive care unit. This review aims to evaluate whether an increase in C-reactive protein is useful for predicting complications arising from severe burns—such as infection, sepsis, multi-organ failure, and mortality—given that these injuries trigger an inflammatory process during which C-reactive protein levels tend to rise.

METHODS

Search strategy An exhaustive search will be conducted in the following databases:

- PubMed/MEDLINE
- Scopus
- Web of Science

- Wiley Online Library
- LILACS / SciELO
- Grey literature: TesiUNAM and other thesis repositories

The search strategy to be employed is: ((Burns OR burn OR “thermal injury” OR “major burn” OR “severe burn”) AND (“C-Reactive Protein” OR CRP OR “acute phase protein”)) AND (Prognosis OR prognostic OR mortality OR sepsis OR infection OR “organ failure” OR “multiorgan failure”)

The search strategy will be adapted for each database. No restrictions regarding language or year of publication will be applied.

Participant or population Patients with severe burns (large-scale thermal, electrical, or chemical burns requiring specialized care). Patients of any age or sex will be included.

Intervention Elevated serum C-reactive protein (CRP).

Comparator Lower or normal CRP levels (as defined by each study).

Study designs to be included Observational studies (prospective or retrospective cohort studies, case-control studies, and cross-sectional studies with prognostic analysis). Case series with clear CRP and outcome data may be included. Randomized trials will be included only if they report prognostic associations of CRP.

Eligibility criteria Inclusion criteria:

- Studies evaluating CRP as a prognostic factor for at least one clinical complication or outcome (infection, sepsis, multiple organ failure, mortality, prolonged hospital stay).
- Any language, any year of publication.

Exclusion criteria:

- Studies not available in full text.
- Case reports, narrative reviews, editorials.
- Studies focusing exclusively on minor burns or on inflammatory conditions unrelated to burns.

Information sources Electronic databases (PubMed, Scopus, Web of Science, Wiley, LILACS/ SciELO) and grey literature (TesiUNAM and institutional repositories). References from relevant reviews will be considered. Additionally, authors will be contacted if data necessary for the review are missing.

Main outcome(s) Mortality (in-hospital) • Development of sepsis or severe

infection • Multiple organ failure / organ dysfunction.

Additional outcome(s) Duration of hospital or ICU stay • Need for surgical interventions related to complications • Any other clinically relevant complication reported by the authors (e.g., renal failure, respiratory failure).

Data management Records retrieved from the databases will be exported to an Excel database, and duplicates will be removed. The selection of titles/abstracts and, subsequently, full-text articles will be performed independently by two reviewers. Discrepancies will be resolved by consensus or through the intervention of a third reviewer. Data extraction will be carried out using a standardized form including: study characteristics, population, details of CRP measurement (timing of measurement, cut-off points, units), outcomes, and effect measures (OR, HR, RR, sensitivity).

Quality assessment / Risk of bias analysis The risk of bias in the included studies will be assessed using the Newcastle-Ottawa Scale for observational studies and the Cochrane Collaboration’s RoB 2 tool if clinical trials are included.

Two reviewers will independently evaluate each study based on the domains of the respective tools. Discrepancies will be resolved by consensus, and a third reviewer will be consulted to resolve them if necessary.

The risk of bias in the included studies will be assessed using the Newcastle-Ottawa Scale for observational studies and the Cochrane Collaboration’s RoB 2 tool if clinical trials are included.

Strategy of data synthesis A narrative synthesis structured around the timing of CRP measurement, cut-off values, and outcomes will be conducted. If sufficiently homogeneous data are available, a random-effects meta-analysis will be considered for dichotomous and continuous outcomes. Heterogeneity will be assessed using the I^2 statistic and Cochran’s Q test. Publication bias will be analyzed using funnel plots if 10 or more studies are available. Results will be presented in accordance with the PRISMA 2020 guidelines.

Subgroup analysis Planned subgroups (if data permit):

- Adult vs. pediatric patients
- Timing of CRP measurement (early vs. late)
- Percentage of total body surface area (TBSA) burned

- Type of burn (thermal vs. electrical).

Sensitivity analysis Sensitivity analyses excluding studies at high risk of bias and studies with extreme cut-off values will be performed if feasible.

Language restriction No language restrictions will be applied.

Country(ies) involved Mexico.

Keywords Major burn; C-reactive protein; CRP; Prognosis; Prognostic factor; Complications; Sepsis; Mortality.

Dissemination plans The results of this systematic review will be submitted for publication in an indexed, peer-reviewed journal, preferably in the fields of burns, intensive care, or surgery.

Contributions of each author

Author 1 - Gustavo Eduardo Sánchez-Martínez - Conceptualization, methodology, literature search, study selection, data extraction, writing – original draft.

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Author 2 - Mirna Ruiz-Ramos - Supervision, risk of bias assessment, critical review of the protocol and manuscript.

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