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ADMINISTRATIVE INFORMATION

Support - No specific financial support.

Review Stage at time of this submission - Retrospective registration during formal screening and preliminary data charting. Preliminary database searching, deduplication, machine-assisted prioritization, and preliminary charting began before registration. A formal protocol was developed after preliminary searches confirmed substantial heterogeneity and a limited direct evidence base. The final eligibility framework was fixed before independent human rescreening of the complete deduplicated set, definitive data verification, citation chaining, and evidence synthesis. Registration documents the frozen selection procedures, evidence tiers, data items, and synthesis plan before the review conclusions are finalized.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202680080

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 August 2026 and was last updated on 21 August 2026.

INTRODUCTION

Review question / Objective Primary question: What evidence is available regarding the feasibility, effectiveness, safety, training requirements, and surgical utility of surgeon- or other non-anesthesiologist-performed brachial plexus block for hand and distal upper-extremity surgery, with particular emphasis on emergency practice and settings where immediate anesthesiology support is limited?

Secondary questions are: (1) How have block success, readiness for incision, supplemental local anesthesia, systemic rescue analgesia, sedation, conversion, and complications been defined and reported? (2) What education, supervision, credentialing, monitoring, and rescue systems have been used? (3) What evidence informs selection among supraclavicular, infraclavicular, and axillary approaches? (4) How are tourniquet tolerance and surgical-field utility reported? (5) What relevant contextual evidence describes distal nerve blocks or surgeon-run local and regional anesthesia services?

Background Timely hand surgery may be constrained by the availability of anesthesiology services, particularly after hours and in resource-limited hospitals. Local infiltration, digital, wrist, or forearm block and wide-awake local anesthesia no tourniquet techniques support selected procedures. However, extensive exploration, multidigit injury, fracture fixation, tendon or nerve

repair, revascularization, and replantation may benefit from dense regional anesthesia and an upper-arm tourniquet. Brachial plexus block may provide distal upper-extremity anesthesia and a bloodless field, but surgeons may avoid it because of concerns about failure, pneumothorax, vascular puncture, neurologic injury, local anesthetic systemic toxicity, and limited rescue capability. Most comparative literature originates from anesthesiologist-led settings and may not address the needs of clinicians who both administer anesthesia and operate.

Rationale Evidence is heterogeneous across operators, approaches, settings, outcome definitions, rescue treatment, and safety follow-up. This review will map direct surgeon and other non-anesthesiologist evidence separately from prespecified contextual evidence and identify implementation, safety, and research gaps. It will not substitute for institutional credentialing, monitoring, or emergency-response standards.

METHODS

Strategy of data synthesis PubMed, Ovid Embase, and Web of Science Core Collection were searched from inception to 21 August 2026 without date or language restrictions. Two complementary strategies were used. The main strategy combined hand and distal upper-extremity terms, operative or traumatic indications, and brachial plexus block terms, including supraclavicular, infraclavicular, and axillary approaches. The supplementary strategy combined upper-extremity regional anesthesia or nerve block terms with surgeon, emergency physician, non-anesthesiologist, training, competency, learning curve, credentialing, and implementation terms. Controlled vocabulary and free-text terms were adapted to each database.

Reference lists of included studies and relevant reviews will be examined. Forward citations of direct-evidence studies will be searched using Web of Science and Google Scholar. Searches will be updated if more than six months elapse before manuscript submission. CENTRAL, CINAHL, Scopus, regional databases, and separate grey-literature databases were not searched and this will be acknowledged as a limitation. Evidence will be synthesized descriptively by evidence tier without pooled effect estimation.

Eligibility criteria Population: Adults or children undergoing operative or procedural treatment of the hand, wrist, forearm, or distal upper extremity. More proximal procedures are eligible only when separately extractable information addresses distal surgery, operator training, block failure, complications, or tourniquet use.

Concept: Regional anesthesia performed by surgeons or other clinicians whose primary specialty is not anesthesiology. Eligible comparisons include block approaches, guidance techniques, anesthetic strategies, operator groups, distal blocks, sedation, or general anesthesia; a comparator is not required.

Context: Emergency departments, operating rooms, outpatient or office settings, fracture clinics, and resource-limited hospitals worldwide. Urgency and anesthesiology availability will be charted rather than required.

Tier 1 comprises brachial plexus blocks performed by eligible non-anesthesiologists. Tier 2 comprises non-anesthesiologist distal upper-extremity blocks and surgeon-run local or regional services. Tier 3 comprises contextual studies identified through the searches or citation chaining that report learning or competency metrics, compare approaches in distal upper-extremity surgery, report complications with a denominator, or report relevant blocks without specifying operator specialty.

Eligible sources include randomized and nonrandomized trials, observational studies, cohort and cross-sectional studies, case series with at least three patients, implementation or education studies, and conference abstracts with original data, extractable operator specialty, and at least one charted outcome. Case reports, registrations without results, cadaveric or purely anatomical studies, shoulder-only analgesia studies, and studies unrelated to procedural or surgical anesthesia will be excluded. Multiple reports from the same cohort will be linked and treated as one study.

Source of evidence screening and selection Two reviewers, Deokhyeon Ryu and Junghyun Lee, will independently assess every title and abstract after piloting the criteria on a random sample of 25 records. Potentially eligible and uncertain records will undergo independent full-text review. Disagreements will be resolved through discussion and consensus. Records without title/abstract consensus will be retained for full-text review. Disagreements remaining after full-text discussion will be resolved by including the study and recording the disagreement. Reasons for full-text exclusion will be standardized.

OpenAI Codex, a GPT-5-based system, was used only to prioritize records and support preliminary evidence mapping; it will not make or replace final human eligibility decisions. Its role, access date, and human verification process will be disclosed in the manuscript. Citation-search records will undergo the same process. Selection will be reported using PRISMA-ScR.

Data management NBIB and RIS records will be consolidated into a deduplicated master database with stable identifiers. A piloted charting form will capture citation, country, design, setting, urgency, participants, procedure, operator specialty, prior case volume, teaching, simulation, supervision, credentialing, block approach, guidance, needle, attempts, performance time, local-anesthetic agent, concentration, total dose, volume and adjuvants, block-to-incision time, readiness definition, operative duration, fasting status when reported, tourniquet site, duration and pain, success, intraoperative pain, supplemental local anesthesia, systemic rescue analgesia, sedation, conversion to general anesthesia, satisfaction, block duration or rebound pain, monitoring, anesthesiology availability, rescue capability, follow-up duration, and limitations.

Prespecified adverse events include pneumothorax, vascular puncture or injection, Horner syndrome, phrenic nerve palsy, local anesthetic systemic toxicity, infection, and transient or persistent neurological symptoms. Missing information will be recorded as not reported and will not be inferred. The charting form may be modified iteratively; all modifications will be reported. Both authors will verify data against source documents.

Reporting results / Analysis of the evidence Main outcomes are block success and readiness for incision, supplemental local anesthesia or systemic rescue analgesia, conversion to general anesthesia, and block-related adverse events. Additional outcomes are operator training and competency, tourniquet tolerance, block-performance and procedural time metrics, and patient and surgeon satisfaction.

Evidence will be synthesized descriptively and separated by the three prespecified evidence tiers. Counts and descriptive proportions may characterize the evidence base, but no inferential comparison or pooled effect estimate will be performed. Outcomes will retain the original denominators and definitions. No formal critical-appraisal or risk-of-bias instrument will be applied because the purpose is to map a heterogeneous evidence base. Study limitations will be charted descriptively, and absence of reported complications will be distinguished from demonstrated safety.

Presentation of the results Results will be presented using a PRISMA-ScR flow diagram, tables of study characteristics and outcomes separated by evidence tier, and an evidence-gap map covering feasibility, effectiveness, safety, training and competency, monitoring and rescue capability, tourniquet and operative utility, approach selection, and relevant contextual service models. Any clinical considerations derived from the evidence map will be labeled as a nonvalidated, evidence-informed implementation aid rather than a clinical guideline.

Language restriction No language restriction will be imposed at the search stage. Translation will be used where feasible, and any exclusions attributable solely to unavailable translation will be documented.

Country(ies) involved Republic of Korea.

Other relevant information This is a retrospectively registered scoping review following Joanna Briggs Institute methodology and PRISMA-ScR. A formal protocol was developed after preliminary searches identified substantial heterogeneity and limited direct evidence. The final eligibility framework was fixed before independent human rescreening, definitive data verification, citation chaining, and evidence synthesis. Any deviations from the registered protocol will be reported in the manuscript under “Differences between the protocol and the review.” INPLASY, PROSPERO, and OSF were searched on 21 August 2026; no completed or ongoing review with the same question and operator focus was identified.

Keywords brachial plexus block; emergency hand surgery; hand surgery; non-anesthesiologist; regional anesthesia; scoping review; surgeon-performed anesthesia; tourniquet; ultrasound guidance.

Dissemination plans The completed review will be submitted to a peer-reviewed journal in plastic, hand, reconstructive, orthopedic, emergency, or regional-anesthesia practice. The manuscript will follow JBI scoping review methodology and PRISMA-ScR. Complete database-specific strategies, the PRISMA-ScR checklist, and supplementary evidence tables will accompany the manuscript as appropriate.

Contributions of each author

Author 1 - Deokhyeon Ryu - Conceptualization; clinical question development; methodology; literature screening; data charting and verification; evidence synthesis; clinical interpretation; writing—original draft; writing—review and editing; project administration.
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