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Research Article

Bridging the Gap: First-Cycle Results of a Multi- Centre NHS Survey on Junior Doctors' Confidence in Managing Acute Orthopaedic Emergencies

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Abstract

Introduction: Acute orthopaedic emergencies like Cauda Equina Syndrome (CES) and Compartment Syndrome demand immediate intervention, yet junior NHS doctors often report significant confidence deficits in handling them. This multi-centre study assesses baseline preparedness across six high-risk conditions to highlight gaps in junior doctor confidence.

Objectives: Our study aims to evaluate baseline confidence levels among junior doctors in diagnosing and managing conditions, including Cauda Equina Syndrome, Compartment Syndrome, Necrotizing Fasciitis, and Fractures with Neurovascular Deficit, septic arthritis and Spinal Injuries; to identify specific gaps in junior confidence in handling these cases; and to recommend targeted interventions.

Methods: This observational study spanned 10 NHS Trusts and included 204 junior doctors, ranging from FY1 to Registrar level. Pre-intervention surveys measured diagnostic confidence, management confidence, and documentation using a 1-5 Likert scale. Data were analysed descriptively.

Results: For Cauda Equina Syndrome, junior doctors reported low confidence in management (2.67/5), with only 30% correctly identifying the diagnostic triad. Registrars showed moderate diagnostic confidence (4.3/5) but demonstrated gaps in MRI interpretation (40%). For Fractures with Neurovascular Deficit: Registrars reported high diagnostic confidence 4.3/5 (86%) while junior doctors showed diagnostic confidence of 2.1/5 (42%); Their management confidence with neurovascular compromise was rated at 4/5 (90%) while juniors reported only 1.1/5 (22%). But for Necrotizing Fasciitis, junior doctors had the lowest management confidence (2.3/5), and 62% were unable to list more than two diagnostic criteria ("Four D's"). Regarding Compartment Syndrome , junior doctors delayed fasciotomy referrals in 68% of cases and had low diagnostic confidence (3.6/5). Registrars showed over-reliance on pressure monitoring (35%). For Spinal Injuries: Across all junior roles, documentation confidence was low (2.5/5), and only 49% felt confident applying the NEXUS criteria. In terms of Septic Arthritis, Junior doctors reported weak confidence in management (3.8/5), while 41% of registrars delayed aspiration pending senior review.

Conclusion: Pre-intervention data reveal widespread confidence deficits among junior doctors, especially FY2/SHOs, in managing acute emergencies. Shortcomings in guideline adherence, diagnostic accuracy, and documentation emphasize the urgent need for structured interventions such as simulation training and decision support tools.

Keywords: *Junior Doctors, Acute Orthopaedic Emergencies, NHS, Education, Confidence, Cauda Equina, Compartment Syndrome, Septic Arthritis.*

Introduction

Acute surgical and orthopaedic emergencies represent critical time-sensitive scenarios where delays in diagnosis or management can lead to permanent disability, limb loss, or death. Within the NHS, junior doctors, particularly resident doctors at the SHO and core surgical trainee levels, often act as the first point of contact for these emergencies. However, several studies have highlighted a persistent lack of confidence in recognising and managing high-stakes conditions among this group [1-3]. This confidence gap continues despite the presence of structured postgraduate training, reflecting disparities in clinical exposure, teaching quality across trusts, and the inherent challenges in managing rare but high-risk pathologies.

Our multi-centre survey across ten NHS trusts assessed resident doctors' competence in managing six critical orthopaedic emergencies. Each case was evaluated through three domains: documentation, acute diagnosis, and acute management. The selected emergencies were Cauda Equina Syndrome, Fractures with Neurovascular Compromise, Necrotising Fasciitis, Compartment Syndrome, Spinal Cord Injuries, and Septic arthritis, which represent time-critical scenarios that demand prompt, confident action.

Cauda Equina Syndrome (CES) represents one of the most time-critical neurosurgical emergencies in the NHS. Studies indicate that earlier surgical intervention is associated with better neurological outcomes, particularly in cases with acute neurological compromise [4]. In the UK, the incidence of CES is estimated at approximately 1.9 per 100,000 population per year, translating to around 600-1,000 cases annually [5].

Junior doctors frequently encounter diagnostic uncertainty when faced with subtle or early presentations. Our study specifically examines confidence gaps in red flag recognition and the impact of structured decision aids on referral accuracy.

Fractures with Neurovascular Compromise present unique challenges in the UK's trauma pathways. While major limb fractures represent about 7% of the patients with upper and lower limb and pelvic fractures admitted to the trauma room. Overall survival was 80% in pelvic fracture and 97% in extremity fracture patients, and comparable to non-vascular trauma patients [6]. The incidence of major lower limb fractures is about 215.9 fractures per 100,000 patients per year [7]. The BOAST guidelines mandate that vascular and neurological status should be assessed and documented immediately upon presentation, and this assessment should be repeated systematically, particularly after any reduction manoeuvres or the application of splints [8]. Our intervention incorporates vascular assessment simulations using pulsatile limb models to address these skills deficits.

Necrotizing Fasciitis is a rapidly progressive, life-threatening, severe soft tissue infection, which makes early recognition imperative. The Age-standardised mortality rate is about 16%, especially with diabetes, old age, chronic renal disease, and heart failure ([9]. Diagnostic challenges are profound, even when using the LRINEC score to guide diagnosis, as with an LRINEC cut-off score =6, the sensitivity was 43%, specificity was 83%. In addition, when the LRINEC cut-off score =8, the sensitivity was 27% (95% confidence interval 19% to 37%), specificity was 93% (95% confidence interval 91% to 94%) ([10]. We evaluate the efficacy of a novel "SKIN-SAVE" mnemonic (Systemic signs, Crepitus, Induration, Necrosis, Speedy progression, Abscess mimic, Violaceous changes, Elevated markers) in improving diagnostic accuracy.

Compartment Syndrome demonstrates significant practice variation across NHS trusts. The incidence of acute compartment syndrome is estimated to be 7.3 per 100,000 in males and 0.7 per 100,000 in females, with the majority of cases occurring after trauma [11]. With early intervention is mandatory to improve the results; still, vague early sign poses a challenge to junior residents, as still no scoring system or definitive scan that is diagnostic. Our intervention introduces mandatory "Compartment Checks" using standardized pain assessment tools and timed escalation protocols.

Spinal Cord Injuries are life-changing injuries with a profound impact on those who are injured and their families. In the UK, there are around 16 new cases per million population of traumatic spinal cord injury each year ([12]. The NICE CG41 guidelines stress that the imaging should be performed urgently and interpreted immediately, Additionally, it recommends a 4-hour time frame after the diagnosis to contact the linked specialized spinal injury centre, and the transfer is to be as soon as possible [13]. Yet we found that most of the residents struggle with spinal clearance, acute management, clear documentation, and imaging interpretation. We assess the impact of immersive VR simulations replicating real-world trauma scenarios on diagnostic confidence.

Septic arthritis is a medical emergency that can lead to rapid joint destruction, reduced mobility, sepsis, and increased mortality, particularly with delayed diagnosis and treatment [14]. The incidence of septic arthritis in the UK has been increasing over recent years. A population-based study analysing data from 1998 to 2013 reported a rise in incidence from 5.5 to 7.8 cases per 100,000 person-years, representing a 43% increase over the 15 years [15]. The increase was most pronounced in individuals over 75 years of age, with incidence rates reaching 31 per 100,000 person-years in this age group [16]. In our study, we assessed the familiarity of the residents with the clinical picture, various investigations, and acute management.

This study represents the first comprehensive evaluation of NHS junior doctors' preparedness across these five Trauma & Orthopaedic high-risk emergencies. By correlating confidence levels with objective knowledge assessments and clinical simulation performance, we can identify critical gaps in current training paradigms. Our phased educational intervention, combining structured decision aids, high-fidelity simulations, and trust-specific escalation protocols, aims to standardize competence in managing these time-critical conditions across diverse NHS settings.

Materials and Methods

Objectives: Assess the baseline confidence of junior doctors in diagnosing and managing 5 acute surgical emergencies.

- Identify gaps in training and guideline awareness.
- Design and implement targeted interventions to improve confidence.
- Evaluate the impact of interventions via post-survey analysis.

Design: Multi-centre NHS observational interventional study planned in two cycles, pre-intervention and post-intervention, over a year

Participants: Junior doctors managing these emergency cases at 10 NHS Trusts across the UK.

Phase 1 (Pre-intervention):

- Surveyed junior doctors across participating NHS Trusts.
- Questions assessed the diagnostic confidence, management confidence, and documentation across the 6 conditions.
- Collected data from FY1, FY2, SHO, and Registrars.
- Intervention: Develop based on pre-intervention survey findings and includes:
- Interactive teaching sessions, incorporating simulation and video-assisted reflection (VAR) training
- Visual display of guidelines and policy posters (NICE and local trust protocols)
- Standardised documentation templates, safety checklists, and easy-to-use diagnostic mnemonics

Phase 2 (Post-intervention):

- Re-administered identical surveys to assess improvements.
- Collected feedback on intervention effectiveness. Inclusion Criteria:
- Resident doctors involved in acute surgical or trauma care (SHOs, Registrars).
- LED/Trainee Doctors working in an NHS setting in the UK.
- Consent to participate and submit responses.

Exclusion Criteria:

- Consultants and associate specialists.
- Doctors who are not involved in managing the conditions being studied.
- Non-English speakers
- Locum/Bank doctors

Data Analysis:

- Surveys were analysed using descriptive statistics.
- Confidence levels were compared across roles for each condition.
- Focus was placed on the three main domains: confidence in Assessment, management, and documentation.

Results

Pre-Intervention Findings (January-March 2025)

A total of 204 junior doctors across 10 NHS Trusts participated in the pre-intervention survey. Amongst which, 17 FY1, 25 FY2, 103 Junior Clinical Fellow (SHO), 59 Registrars/Middle grades. This survey sought to evaluate the confidence and competence of trainees in managing six acute orthopaedic emergencies. A total of thirty questions aimed to explore three main domains for each condition: confidence in diagnosis and management, and documentation proficiency.

Cauda Equina Syndrome (CES) emerged as a critical area of concern, particularly among junior trainees. Among the 145 FY1s, FY2s, and SHOs, only 20 individuals (13.8%) could accurately list all the red flag criteria essential for CES diagnosis, a startling statistic given the urgency and medico-legal weight of the condition. Their average confidence score in managing CES was 2.67/5 (53.4%), suggesting significant uncertainty in initiating appropriate steps. Conversely, registrars reported substantially higher management confidence levels, with an average score of 4.3/5 (86%). Interestingly, documentation proficiency was paradoxically better among juniors 3.0/5 (60%) than registrars 2.0/5 (40%), possibly reflecting a cautious approach by juniors despite their diagnostic uncertainty. This is further contextualised by diagnostic confidence scores, where registrars rated themselves at 4.0/5 (80%) compared to 2.8/5 (56%) for junior colleagues, a 24% gap in foundational awareness (Figure 1).

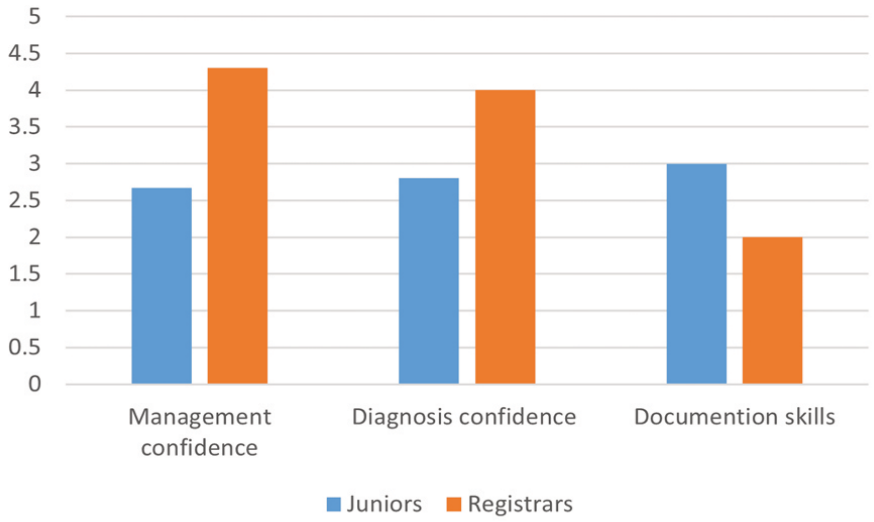

Figure 1. Cauda equine Syndrome.

When assessing Fractures with Neurovascular Deficit, the contrast between training grades was even starker. Registrars demonstrated a high level of competence, scoring 4.5/5 (90%) for management confidence and 4.3/5 (86%) in diagnostic confidence. In contrast, junior doctors reported critically low confidence in this domain. Their management confidence with neurovascular compromise was rated at just 1.1/5 (22%), and diagnostic confidence at 2.1/5 (42%). Both figures underscore an urgent need for targeted education.

Documentation standards followed the same pattern: juniors scored 2.0/5 (40%) while registrars scored twice as high (4.0/5, 80%). These results suggest that many juniors may not fully appreciate the urgency or complexity of such injuries, leading to delayed recognition and suboptimal early management (Figure 2).

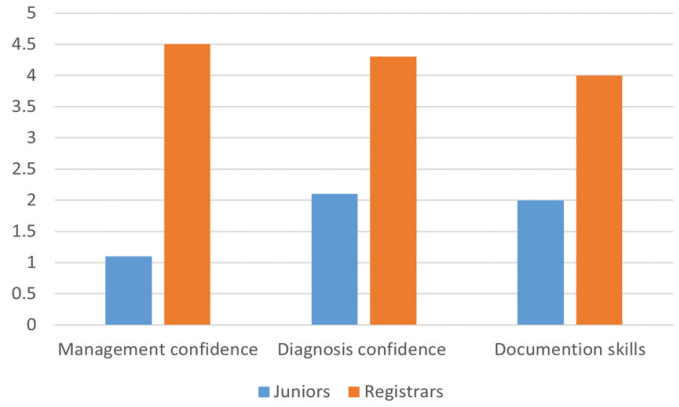

Figure 2. Fractures with Neurovascular Deficit.

Necrotizing Fasciitis is a rapidly progressive soft tissue infection with high morbidity and mortality, which is also poorly understood among juniors. Their average diagnostic confidence was 2.7/5 (54%), and management confidence was just 2.3/5 (46%). In contrast, registrars demonstrated greater awareness and competence, with diagnostic confidence and management confidence scores of 3.5/5 (70%) and 3.8/5 (76%), respectively. These findings, though expected given the rarity of the condition, highlight a potential risk: juniors may misattribute early signs of necrotizing fasciitis to benign soft tissue infections. Documentation again reflected this trend, with juniors at 2.3/5 (46%) and registrars at 4.0/5 (80%), suggesting a consistent gap not only in knowledge but in clinical recording (Figure 3).

When considering Compartment Syndrome, a limb-threatening emergency, the data again underscored disparity. Junior doctors reported a management confidence of only 2.3/5 (46%), while registrars averaged 3.4/5 (68%); a 22% gap. Encouragingly, juniors showed better diagnostic confidence in this condition compared to others, scoring 3.6/5 (72%) versus 4.2/5 (84%) for registrars. This may reflect improved undergraduate emphasis on this diagnosis or increased exposure in trauma settings. Documentation quality was notably higher among both groups, with juniors scoring 3.5/5 (70%) and registrars 4.2/5 (84%), suggesting that once suspicion is raised, record-keeping tends to be more thorough (Figure 4).

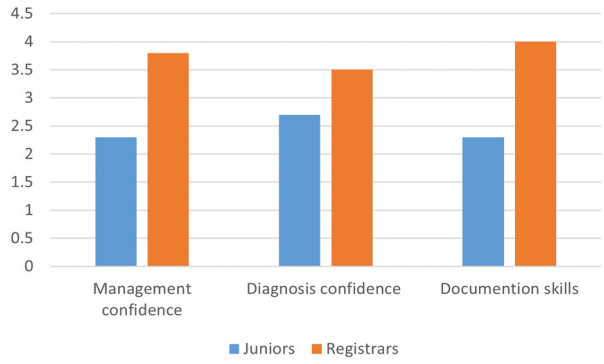

Figure 3. Necrotizing Fasciitis.

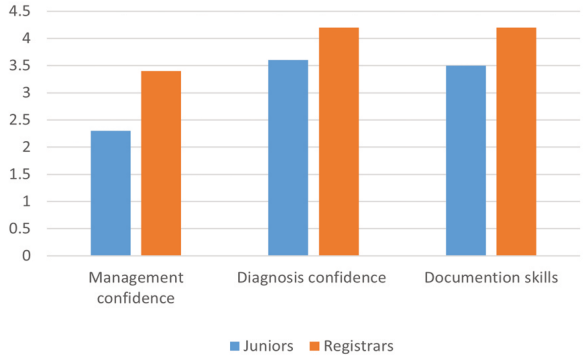

Figure 4. Compartment Syndrome.

In the domain of Spinal Injuries, registrars again outperformed junior doctors. They reported an average diagnostic confidence score of 3.8/5 (76%), compared to 3.0/5 (60%) among juniors, signifying a minimum 16% deficit in confidence with spinal assessment frameworks. Management confidence among juniors was2.8/5 (56%), while registrars rated themselves at 3.4/5 (68%). Though the overall confidence gap (12%) is narrower than in other conditions, it still reflects substantial room for improvement. Documentation proficiency mirrored this, with juniors scoring 2.5/5 (50%) and registrars 3.5/5 (70%) (Figure 5).

Finally, Septic Arthritis was the condition in which junior doctors showed the highest levels of self-reported confidence. They averaged 3.8/5 (76%) for both management and diagnostic confidence, while registrars reported 4.7/5 (94%) for diagnostic confidence and 4.4/5 (88%) for management confidence. Still higher but with a comparatively narrower gap. Documentation scores were similarly reassuring, with juniors averaging 4.0/5 (80%) and registrars 4.2/5 (84%). These figures may indicate that septic arthritis is more regularly encountered or better taught at junior levels compared to other conditions (Figure 6).

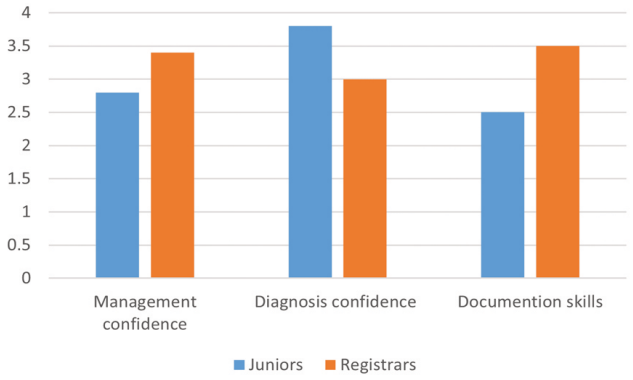

Figure 5. Spinal Injuries.

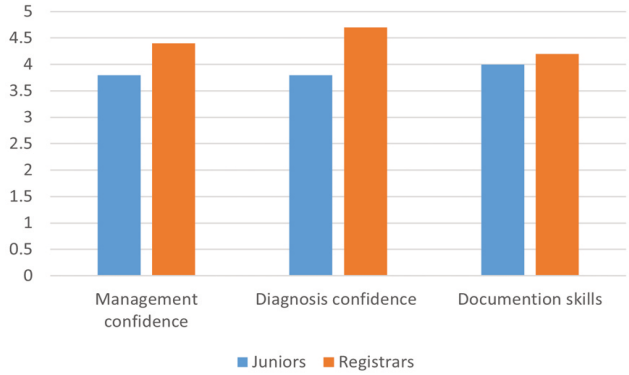

Figure 6. *Septic Arthritis*.

Key Trends: Role-Specific Gaps: FY2/SHOs scored <60% in 5/6 conditions for management and documentation. Guideline Awareness: Only 45% of juniors could correctly cite condition-specific NHS protocols.

Escalation Delays: 52% of FY2s deferred critical decisions to seniors, even with clear red flags.

Implications: These findings highlight systemic deficits in junior doctors' preparedness for acute surgical emergencies, emphasizing the need for standardized training in high-stakes decision-making and guideline adherence.

Discussion

The findings of this study highlight a significant confidence gap among junior doctors in managing acute orthopaedic emergencies, particularly in documentation and emergent management planning. These results align with existing literature that underscores the challenges early-career physicians face when confronted with high-stakes clinical scenarios. [17] The perceived lack of preparedness among junior trainees suggests a need for more structured and practical educational interventions to enhance their confidence and competence in acute surgical care.

Key Findings and Implications

1. Inadequate Preparedness among Junior Doctors:

A recurring theme in this study was the self-reported lack of confidence among junior doctors, especially those in the early stages of training. This finding is consistent with prior research indicating that many trainees feel ill-equipped to handle time-sensitive surgical emergencies due to limited hands-on exposure [18].

The steep learning curve in surgical specialties, combined with the unpredictable nature of emergencies, exacerbates this issue. Without deliberate training strategies, junior doctors may struggle to make critical decisions under pressure, potentially compromising patient outcomes.

2. Deficiencies in Documentation and Emergent Management Planning

The study identified documentation and emergent management planning as persistent weaknesses. Poor documentation can lead to miscommunication among healthcare teams, delays in treatment, and increased medico-legal risks [19, 20].

Additionally, the absence of structured management plans suggests a gap in systematic training on clinical decision-making pathways. These findings emphasize the need for standardized protocols, agreed templates, and checklists to guide junior doctors in acute scenarios.

Recommendations for Intervention

To address these gaps, alongside traditional training courses and orientation sessions, the following evidence-based strategies are proposed:

1. Interactive teaching sessions, incorporating simulation and video-assisted reflection (VAR) training;

High-fidelity simulation, including immersive VR-based scenarios that mirror real-world trauma situations, has been shown to boost diagnostic confidence, technical performance, situational awareness, and team dynamics in emergency contexts.

Conducting regular simulation training on prevalent surgical emergencies, such as acute abdominal issues, trauma cases, and postoperative complications, helps strengthen both clinical competencies and non- technical skills (e.g., communication, leadership). The integration of structured debriefing sessions enhances learning by enabling reflective practice and performance analysis. [21-24].

2. Visual display of guidelines and policy posters (NICE and local trut protocols)

Many junior doctors reported uncertainty in following best practices during emergencies. The implementation of easily accessible, specialty-specific guidelines, such as quick-reference handbooks or digital decision-support tools, could mitigate this issue. Studies have shown that adherence to clinical guidelines improves patient outcomes and reduces variability in care. Hospitals should ensure these resources are regularly updated and integrated into clinical workflows [25, 26].

3. Standardised documentation templates, safety checklists, and easy-to-use diagnostic mnemonics

Given persistent gaps in documentation, implementing standardised templates for acute surgical presentations may enhance accuracy and completeness. Electronic medical record (EMR) systems with embedded prompts for key clinical details (e.g., time of symptom onset, vital signs, initial management) could minimise omissions and support continuity of care. Additionally, the use of memorable mnemonics, such as the novel "SKIN-SAVE" for necrotizing fasciitis, offers a practical method to both recall diagnostic features and document them comprehensively. These initiatives should be supported by targeted training sessions on effective documentation techniques [27-30].

Conclusions

This multi-centre study reveals a substantial confidence gap among NHS junior doctors in managing acute orthopaedic emergencies, particularly in areas of documentation and emergent management planning.

Despite the existence of structured training pathways, many junior clinicians report feeling underprepared to navigate high-risk, time-sensitive scenarios. These findings underscore the urgent need for targeted educational strategies that go beyond traditional teaching methods.

Implementing high-fidelity simulation, structured decision aids, standardised documentation templates, and accessible clinical guidelines can significantly enhance junior doctors' preparedness. By prioritising practical, evidence-based interventions, NHS trusts can bridge the current training gaps and promote safer, more effective acute orthopaedic care across institutions.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Mohamed Elgamal, Hatem Hussein, Ahmed Shaalan, Mohamed Hashem, Mohamed Wahb

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Drafting of the manuscript: Mohamed Elgamal, Hatem Hussein, Ahmed Shaalan, Mohamed Hashem, Mohamed Wahb

Critical review of the manuscript for important intellectual content: Mohamed Elgamal, Hatem Hussein, Ahmed Shaalan, Mohamed Hashem, Mohamed Wahb

Supervision: Mohamed Elgamal, Hatem Hussein, Ahmed Shaalan, Mohamed Hashem, Mohamed Wahb

Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue.

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of Interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work.

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