



www.bioinformation.net
Volume 22(3)



Research Article

Received March 1, 2026; Revised March 31, 2026; Accepted March 31, 2026, Published March 31, 2026

DOI: 10.6026/973206300221405

SJIF 2026 (Scientific Journal Impact Factor for 2026) = 8.478

2022 Impact Factor (2023 Clarivate Inc. release) is 1.9

Declaration on Publication Ethics:

The author's state that they adhere with COPE guidelines on publishing ethics as described elsewhere at <https://publicationethics.org/>. The authors also undertake that they are not associated with any other third party (governmental or non-governmental agencies) linking with any form of unethical issues connecting to this publication. The authors also declare that they are not withholding any information that is misleading to the publisher in regard to this article.

Declaration on official E-mail:

The corresponding author declares that lifetime official e-mail from their institution is not available for all authors

License statement:

This is an Open Access article which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited. This is distributed under the terms of the Creative Commons Attribution License

Comments from readers:

Articles published in BIOINFORMATION are open for relevant post publication comments and criticisms, which will be published immediately linking to the original article without open access charges. Comments should be concise, coherent and critical in less than 1000 words.

Disclaimer:

Bioinformation provides a platform for scholarly communication of data and information to create knowledge in the Biological/Biomedical domain after adequate peer/editorial reviews and editing entertaining revisions where required. The views and opinions expressed are those of the author(s) and do not reflect the views or opinions of Bioinformation and (or) its publisher Biomedical Informatics. Biomedical Informatics remains neutral and allows authors to specify their address and affiliation details including territory where required.

Edited by Vini Mehta

E-mail: vmehta@statsense.in

Citation: Karadiguddi *et al.* Bioinformation 22(3): 1405-1408 (2026)

Multidisciplinary management in panfacial trauma: A clinical study

Pallavi Karadiguddi¹, Prachi Dwivedi^{2,*}, Vijay Shekhar³, Sree Ram Reddy⁴, Khushboo Chhabaria Peswani⁵, Ravinder Pal Singh Rana⁶ & Rahul Tiwari⁷

¹Department of Oral and Maxillofacial Surgery, KLE JGMM Medical College, Hubli, Karnataka, India; ²Department of Oral and Maxillofacial Surgery, PGMO, District Hospital Shivpuri, Madhya Pradesh, India; ³Department of Dentistry, Nalanda Medical College Hospital, Agamkuan, Patna, Bihar, India; ⁴Department of oral and maxillofacial surgery, Sree Mithra Dental and MaxFace Specialists, Tanuku, Andhra Pradesh, India; ⁵Department of Oral and Maxillofacial Surgery, RKDF Dental College and Research Centre, Bhopal, Madhya Pradesh, India; ⁶Department of Dental Surgery, Command Military Dental Centre, Jaipur, Rajasthan, India; ⁷Department of Oral and Maxillofacial Surgery, Narsinhbhai Patel Dental College and Hospital, Sankalchand Patel University, Visnagar, Gujarat, India; *Corresponding author

Affiliation URL:

<https://klejgmmmc.edu.in/>
<https://shivpuri.nic.in/en/public-utility/district-hospital-shivpuri/>
<http://nmcch.ac.in/>
<https://sreemithradental.com/>
<https://www.rkdf.ac.in/>
<https://indianarmy.nic.in/>
<https://npdch.edu.in/>

Author contacts:

Pallavi Karadiguddi - E-mail: drpallavikaradiguddi@gmail.com
Prachi Dwivedi - E-mail: prachipd96@gmail.com
Vijay Shekhar - E-mail: vjsspitzer@yahoo.in
Sree Ram Reddy - E-mail: shreeramshree@gmail.com
Khushboo Chhabaria Peswani - E-mail: drkhushboopeswani@gmail.com
Ravinder Pal Singh Rana - E-mail: nicedentistrana@gmail.com
Rahul Tiwari - E-mail: rtcfurgeon@gmail.com

Abstract:

Management of panfacial fractures lacks standardized multidisciplinary pathways and variability in coordination, surgical sequencing and airway planning may contribute to delays and postoperative complications. Therefore, it is of interest to assess if a structured multidisciplinary team (MDT) referral system leads to an improvement in process and outcome measures versus usual care where patients are referred sequentially. A comparison of a single-center cohort with two different treatment strategies; primary outcomes were time-to-definitive fixation and major postoperative complications. Secondary outcomes were airway strategy, prolonged hospitalization, reoperation rate and functional occlusal alignment at 3 months. MDT pathway was found to lead to reduction in time to definitive management and less complications advocating the use of structured-multidisciplinary workflow in panfacial trauma services.

Keywords: Panfacial fracture; multidisciplinary team (MDT); airway management; virtual surgical planning (VSP); outcomes

Background:

Panfacial fractures are high-energy and injurious to numerous facial subunits; associated airway, ocular and intracranial issues are common place, rendering treatment inherently team-oriented. Modern clinical series have stressed that stabilization is only a consideration with regard to fixation technique but also in the case of concomitant procedures, timing and responsible specialty input for minimizing secondary deformity and complications [1]. The sequence of surgical procedure is still under a matter of debate and the recent literature confirms that "bottom-up/top-down" concepts can be in close agreement with each other, except for very complex patterns where custom procedural sequence may be proposed based on dominant fragments and reliable reference units [2, 3]. Variation in provider pathways and specialization-defined care has also been associated with variations in complications on systematic review, supporting the case for standardization of practice [4]. Simultaneously, point-of-care virtual surgical planning (VSP) and three-dimensional (3D) printing are emerging in complex craniofacial trauma to improve reduction accuracy and operative efficiency along with team-based planning [5]. Therefore, it is of interest to report and compare clinical process measures and early outcomes of a structured multidisciplinary pathway versus non-pathway care in patients with panfacial trauma.

Materials and Methods:

A comparative clinical cohort research was done at a tertiary trauma referral center from January 2022 to December 2024. An MDT pathway was started in January 2023, so outcomes were compared between standard care (pre-pathway) and MDT pathway care (post-pathway). Institutional audit approval was obtained and data were taken from prospectively maintained trauma logs and electronic medical records. Adults aged ≥ 18 years with operatively treated panfacial fractures (mandible with midface and/or upper face involvement) were included. Exclusion criteria were isolated single-region fractures, definitive treatment at another hospital, death within 48 hours due to non-facial causes, or incomplete documentation. The MDT pathway included coordinated assessment by maxillofacial surgery, anaesthesiology, trauma surgery, ophthalmology (and neurosurgery when needed), standardized airway planning, CT-based operative mapping and planned theatre access. Primary outcomes were time from admission to definitive ORIF and a composite major complication within 12 weeks (deep infection/plate exposure, clinically significant malocclusion needing reintervention, vision-threatening complication, or unplanned return to theatre). Secondary outcomes included airway approach, ICU and hospital length of stay and reoperation rate. Continuous variables were analyzed using Student's t-test or Mann-Whitney U test, categorical variables

using χ^2 or Fisher's exact test and significance was set at two-sided $p < 0.05$.

Results:

Baseline features between cohorts were similar, demonstrating good clinical comparability of standard care and MDT pathway groups. The majority of patients were young men and road traffic injury was the leading cause. Frequency of CT-confirmed traumatic brain injury and complex midface patterns were comparable and orbital involvement was common in both groups, in line with the usual complexity of panfacial trauma. No baseline variable was statistically significant, thus it is less likely that outcome differences were biased by unmeasured

initial case-mix **Table 1**. MDT reduced the time to definitive ORIF by a substantial amount and also raised the number of children treated within 5 days. MDT care demonstrated also greater utilization of submental intubation and CT-VSP/3D-assisted planning. The length of stay was significantly shorter in the MDT group. While the composite overall major complication rate was less with MDT care (numerically), this did not achieve statistical significance, "probably due to the low number of events relative to sample size". Favoured trends were also seen for reduced number of, infections, malocclusion events and unplanned returns to theatre **Table 2**.

Table 1: Baseline characteristics by care model

Variable	Standard care (n=46)	MDT pathway (n=46)	p-value
Age, years (mean \pm SD)	31.8 \pm 10.9	33.2 \pm 11.4	0.548
Male sex, n (%)	38 (82.6)	37 (80.4)	0.785
Road traffic injury, n (%)	29 (63.0)	31 (67.4)	0.657
Assault, n (%)	10 (21.7)	8 (17.4)	0.598
Fall/other, n (%)	7 (15.2)	7 (15.2)	1.000
Associated TBI (CT-confirmed), n (%)	14 (30.4)	12 (26.1)	0.647
Midface pattern (Le Fort II/III or comminuted), n (%)	34 (73.9)	35 (76.1)	0.806
Orbital involvement requiring evaluation, n (%)	27 (58.7)	29 (63.0)	0.670

Table 2: Management process metrics and clinical outcomes

Outcome	Standard care (n=46)	MDT pathway (n=46)	p-value
Time to definitive ORIF, days (median [IQR])	6 [4-9]	4 [3-6]	0.003
Definitive fixation \leq 5 days, n (%)	19 (41.3)	31 (67.4)	0.012
Submental intubation, n (%)	6 (13.0)	15 (32.6)	0.028
Tracheostomy, n (%)	12 (26.1)	6 (13.0)	0.109
VSP/3D-assisted planning used, n (%)	7 (15.2)	19 (41.3)	0.006
Hospital LOS, days (mean \pm SD)	12.6 \pm 6.8	9.8 \pm 5.4	0.031
Major complication composite, n (%)	14 (30.4)	7 (15.2)	0.087
Deep infection/plate exposure, n (%)	7 (15.2)	3 (6.5)	0.186
Clinically significant malocclusion needing reintervention, n (%)	6 (13.0)	2 (4.3)	0.140
Unplanned return to theatre, n (%)	8 (17.4)	3 (6.5)	0.109

Discussion:

Current research suggests that structuring panfacial trauma management as an MDT pathway improves key process metrics. That included earlier definitive fixation, increased advanced planning utilization. This is associated with clinically meaningful reductions in LOS and complication trends. Airway strategy is a central MDT decision point in panfacial trauma. Current research's increased use of submental intubation aligns with contemporary evidence supporting submental routes as a pragmatic alternative when nasotracheal intubation is contraindicated and operative access precludes standard oral tubes [6, 7]. Comparative outcome data indicate submental intubation can reduce infection and hospitalization compared with tracheostomy in selected populations. This is consistent with current research's observed reduction in LOS and a numerical decline in tracheostomy rates [6, 8]. Because airway choice intersects with fracture pattern, operative sequencing and planned fixation stages, embedding anesthesiology early into the workflow likely contributed to improved coordination and theatre readiness [7, 9]. A second MDT-linked mechanism is surgical planning standardization. We observed significantly higher adoption of VSP/3D-assisted planning in the MDT cohort. Evidence from acute complex maxillofacial trauma

supports CT-driven VSP to improve preoperative understanding of fracture anatomy, plate adaptation strategy and operative efficiency-particularly in comminuted, multi-subunit injuries [10, 11]. Likewise, broader evaluations of 3D printing in acute maxillofacial trauma describe benefits in pre-bending plates, improving spatial orientation and facilitating team communication. This is relevant to multidisciplinary planning meetings and shared mental models [12]. Current data cannot confirm whether VSP directly reduced complications. However, improved planning may reduce reduction errors that lead to malocclusion or secondary deformity and these outcomes trended lower in the MDT group. MDT pathways are also "referral hygiene" interventions-promoting expediency, clarifying responsibility and standardizing early consult triggers. Literature on quality improvement initiatives for structured facial injury referral networks indicate that the use of standardised processes can enhance completeness of assessment and optimise patient care. This is in keeping with the current pathway design and parallels the trend for time to definitive fixation [9]. Furthermore, modern studies of fracture configurations further substantiate that panfacial injury frequently presents concomitantly with complex mandibular, midface and cranial base-related issues highlighting why

concerted decision-making is necessary [13, 14]. Rapid epidemiologic transitions and external system pressures (e.g., resource limitations, changes in trauma patterns) further support the need to maintain resilient MDT systems that endorse protocolized care delivery [15]. Limitations are that this was a single center study, the relatively small number of patients and before/after type comparisons prone to temporal confounding such as staffing and theatre access. The composite measure of complications may be in need of larger comparison groups to draw safe conclusions. However, the demonstrated gains in timeliness, adoption of planning and LOS support the practical utility of MDT pathways as a system-level intervention for panfacial trauma care.

Conclusion:

One MDT structured pathway (panfacial trauma) was related to more prompt definitive fixation, further utilization of predictive models and less time spent in hospital. Major complications were numerically less in the MDT group but results of a larger study would be required to determine an effect size. In general, standardized multi-disciplinary protocols may enhance efficiency and promote a safer, better coordinated reconstruction in challenging panfacial trauma.

Advancement to Knowledge:

This clinical cohort study provides contemporary evidence (2020–2025 context) that implementation of a structured multidisciplinary team (MDT) pathway in panfacial trauma is associated with significantly reduced time to definitive fixation, increased adoption of VSP/3D-assisted planning, shorter hospital stay and favorable trends in complication rates compared with non-pathway care, thereby supporting

protocolized MDT workflows as a system-level quality improvement strategy.

References:

- [1] Cynthia S *et al.* *J Oral Biol Craniofac Res.* 2023 **13**:79. [PMID: 36504485]
- [2] Yoon JH *et al.* *Arch Craniofac Surg.* 2022 **23**:256. [PMID: 36596748]
- [3] Wong P *et al.* *Craniofacial Trauma Reconstr.* 2025 **18**:3. [PMID: 40271469]
- [4] Pauna HF *et al.* *Braz J Otorhinolaryngol.* 2024 **90**:101374. [PMID: 38377729]
- [5] Hussein SM *et al.* *J Clin Med.* 2025 **14**:2788. [PMID: 40283618]
- [6] Cirignaco G *et al.* *Craniofacial Trauma Reconstr.* 2025 **18**:21. [PMID: 40271461]
- [7] Williams KD *et al.* *Cureus.* 2022 **14**:e27475. [PMID: 36060344]
- [8] Roochi MM *et al.* *Oral Maxillofac Surg.* 2025 **29**:189. [PMID: 41152573]
- [9] Alatishe AO *et al.* *Future Healthc J.* 2023 **10**:81. [PMID: 38406677]
- [10] Singerman KW *et al.* *Craniofacial Trauma Reconstr.* 2025 **18**:18. [PMID: 40271468]
- [11] Abdul Lateef Hassan T & Mohammed DA. *J Craniofac Surg.* 2023 **34**:e218. [PMID: 36217233]
- [12] Bertin E *et al.* *3D Print Med.* 2025 **11**:33. [PMID: 40591060]
- [13] Bonitz L *et al.* *Oral Maxillofac Surg.* 2025 **29**:187. [PMID: 41139708]
- [14] Bicsák Á *et al.* *J Craniofacial Trauma Reconstr.* 2025 **53**:1704. [PMID: 40701912]
- [15] Sada-Urmeneta A *et al.* *J Clin Med.* 2024 **13**:1947. [PMID: 38610713]

Caveat Emptor is applicable among the literate community where required and possible. The publisher, its journal, editors and the internal/external reviewers take adequate steps to check, evaluate, correct, edit, revise and improve content where possible and required.