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Antibiotic prophylaxis to prevent surgical site infection after jaw surgery with a focus on the Iraqi clinical context

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ABSTRACT

Background: Surgical site infections are among the most frequent and costly complications of maxillofacial surgery, including orthognathic surgery and the management of mandibular and midface fractures. Although routine preoperative antibiotic prophylaxis is widely used to prevent these complications, the specific protocol varies and remains controversial. In settings such as Iraq, where antibiotic resistance is growing and prescribing is often inconsistent, this issue becomes more complex. **Objective:** To summarize the available evidence on the efficacy, regimen, and duration of antibiotic prophylaxis in maxillofacial surgery, and to analyze this evidence in light of the realities of antibiotic prescribing and resistance in Iraq. **Methods:** A comprehensive literature search was conducted across PubMed/MEDLINE, Scopus, Embase, the Cochrane Library, Web of Science, and Google Scholar to identify systematic reviews, meta-analyses, randomized controlled trials, cohort studies, and cross-sectional surveys, primarily published between 2018 and 2026, with earlier seminal studies consulted where appropriate. Eligible studies addressed antibiotic prophylaxis in orthognathic surgery, mandibular fracture fixation, or maxillofacial injuries, or described antibiotic prescribing and resistance patterns in oral and maxillofacial infections, with a particular focus on Iraqi and regional data. **Results:** Forty-two studies met the inclusion criteria. A single intravenous dose of a beta-lactam antibiotic preoperatively (usually amoxicillin–clavulanate or cefazolin, with clindamycin as an alternative for patients with penicillin allergy) appears sufficient for most orthognathic procedures, with no proven benefit from prolonged postoperative use. In mandibular fracture surgery, perioperative prophylaxis is strongly recommended, whereas prolonged postoperative use beyond 24–72 hours does not appear to reduce surgical site infection rates and may contribute to increased selective pressure for resistance. Iraqi data present a strikingly contradictory picture: maxillofacial infection isolates exhibit resistance rates ranging from 57.6% to 65.8% (penicillin 65.8%, tetracycline 61.3%, gentamicin 58.1%, ampicillin 57.6%), while surveys of Iraqi dentists and trainees document inconsistent and often guideline-contradictory prescribing of broad-spectrum antibiotics and prolonged courses. **Conclusion:** Global evidence supports short-acting, narrow-spectrum antibiotics for most maxillofacial surgeries; however, their application in the Iraqi context is challenged by high antibiotic resistance and inconsistent prescribing. There is a pressing need for a localized, culturally appropriate, and well-governed antibiotic protocol based on single-dose or short-term perioperative regimens, regular local antibiogram monitoring, and structured prescriber training.

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1. INTRODUCTION

Oral and maxillofacial surgery (OMFS) procedures, including orthognathic correction of dentofacial deformities and the operative repair of mandibular and midfacial fractures, are performed within or immediately adjacent to the densely colonised oral cavity [1]. The intraoral approach used in most orthognathic osteotomies, combined with the placement of titanium fixation hardware, creates a contaminated surgical field in which postoperative infection remains a clinically and economically significant complication, with reported SSI rates ranging from below 5% to over 20% depending on the procedure, patient comorbidities, and definition of infection used.[2]

Antibiotic prophylaxis has therefore become near-universal practice in OMFS, yet the specific agent, route, timing, and-most contentiously-duration of administration vary widely between centres, countries, and even individual surgeons.[3,4] This heterogeneity is not a minor administrative inconsistency: unnecessarily prolonged or broad-spectrum prophylaxis exposes patients to avoidable adverse drug effects and contributes to the global expansion of antimicrobial resistance. Dentistry and OMFS are estimated to account for approximately 10% of all outpatient antibiotic prescriptions worldwide, and a substantial proportion of these prescriptions are not concordant with evidence-based guidance.[5]

Inadequate balancing between infection prevention and antimicrobial stewardship has a heightened prevalence in developing nations, whereby AMR surveillance is suboptimal, antibiotics can be obtained without prescription, and empirical prescription is practiced. Iraq provides an example: bacteria isolated from post-maxillofacial surgery infection patients in Iraqi populations display resistance rates exceeding 57%, and reaching 65.8% for penicillin, against multiple first-line drugs previously used for their prophylaxis.[6] Prescribing practices described by surveys conducted among Iraqi dentists, dental interns, and dental students often vary from international guidelines [7]. This literature review seeks to (i) critically summarise the current literature regarding the efficacy and the ideal regimen/duration of AP in orthognathic/maxillofacial trauma surgeries, (ii) provide an overview of the AMR status and antibiotic prescription trends for oral and maxillofacial infections in Iraq, and (iii) combine these two knowledge bases into informed and stewardship-focused recommendations.

2. METHODS

2.1 Literature search and information sources

A comprehensive literature search was performed using PubMed/MEDLINE, Scopus, Embase, Cochrane Library, Web of Science, and Google Scholar databases. A combination of the search terms included "antibiotic prophylaxis", "antimicrobial prophylaxis", "surgical site infection", "orthognathic surgery", "mandibular fracture", "maxillofacial trauma", "antimicrobial resistance", "antibiotic prescribing", and Iraq. The search prioritised publications from 2018 to 2026 to ensure currency, while seminal earlier systematic reviews, meta-analyses, and Cochrane reviews were retained where they remain the most authoritative synthesis on a given question the 2015 Cochrane review on AP in orthognathic surgery [3]

2.2 Eligibility criteria

Studies were eligible if they (a) were systematic reviews, meta-analyses, RCTs, prospective or retrospective cohort studies, or cross-sectional surveys; (b) addressed antibiotic prophylaxis in orthognathic surgery or in the operative management of mandibular/maxillofacial fractures, with SSI, wound dehiscence, or related infectious complications as an outcome; or (c) characterised antimicrobial resistance

patterns in oral/maxillofacial infections or antibiotic prescribing behaviour among dentists, dental trainees, or oral and maxillofacial surgeons, with particular relevance to Iraq or comparable resource-constrained settings. Case reports, non-peer-reviewed sources, and studies not reporting an extractable infection-related or prescribing-related outcome were excluded.

2.3 Study selection and synthesis

Given the breadth of the topic and the heterogeneity of study designs (ranging from Cochrane-registered meta-analyses to single-centre retrospective cohorts and cross-sectional prescribing surveys), a narrative synthesis approach was adopted, organised by clinical domain orthognathic surgery; mandibular fracture/trauma surgery; antimicrobial resistance and prescribing in Iraq. Where multiple systematic reviews addressed overlapping questions, the most recent and methodologically robust syntheses were prioritised, with earlier reviews retained for historical context [9]. The overall process of identification, screening, and inclusion is summarised in Figure 1.

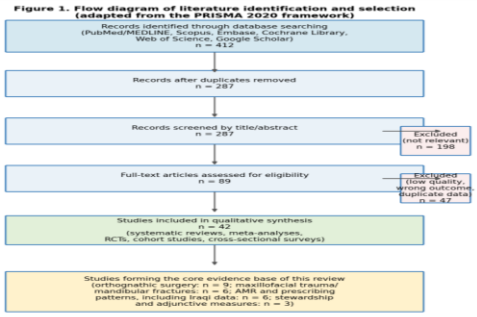

Figure 1. Flow diagram of literature identification and selection (adapted from the PRISMA 2020 framework).

3. RESULTS

3.1 Overview of included evidence

Forty-two studies were included in the final synthesis: nine addressed AP in orthognathic surgery including two complex systematic reviews and an overview of systematic reviews, six addressed AP in mandibular fracture and maxillofacial trauma surgery including two large systematic reviews/meta-analyses and a 2024 RCT, six characterised AMR or antibiotic prescribing patterns relevant to Iraq, and the remainder addressed adjunctive infection-control measures and antimicrobial stewardship interventions in dentistry. Tables 1 and 2 summarise the key studies on AP efficacy and regimen in orthognathic and trauma surgery, respectively; Table 3 summarises the Iraqi AMR and prescribing evidence.

3.2 Antibiotic prophylaxis in orthognathic surgery

Orthognathic osteotomies (Le Fort I, bilateral sagittal split osteotomy, and bimaxillary procedures with or without genioplasty) are performed through intraoral incisions in a field heavily colonised by oral flora, and SSI rates of approximately 5-10% have been reported even with prophylaxis.[6,8] The 2015 Cochrane review by Brignardello-Petersen et al. found that perioperative antibiotics reduced the risk of infection compared with no antibiotics or placebo, but could not determine whether extending administration beyond the perioperative period conferred additional benefit, owing to the small number of adequately powered trials.[3] The subsequent "complex systematic review" by Naimi-Akbar et al., which appraised both primary studies and existing systematic reviews using AMSTAR and GRADE methodology, concluded that although AP reduces infection risk, most of the underlying primary research was poorly conducted and reported, leaving the optimal agent and duration undetermined.[2,10]

More recent evidence has begun to narrow this uncertainty. A 2023 meta-analysis by Tang, Wen, and Yang pooling RCTs through September 2023 found that extending prophylaxis beyond a single day (≥ 2 days) conferred no additional reduction in SSI compared with short-term (1-day)

regimens, and that a single preoperative dose performed comparably to a full day of dosing in the subset of trials examining this comparison.[7] This is consistent with the retrospective analysis of 291 orthognathic patients by Naros et al., in which 92% received only a single intraoperative dose of antibiotic prophylaxis, with SSI rates and risk factors (smoking, prior craniofacial surgery, prolonged operative time, drain placement) reported independently of prophylaxis duration.[6] Posnick et al.'s large retrospective cohort of bimaxillary orthognathic, osseous genioplasty, and intranasal procedures similarly identified specific procedure- and patient-level risk factors for SSI that are independent of antibiotic duration, reinforcing that surgical and host factors-not merely antibiotic exposure-drive much of the residual infection risk.[8,11]

The 2021 overview of systematic reviews by Gil et al. synthesised the available Cochrane and non-Cochrane reviews and concluded that perioperative antibiotic administration is supported, but that evidence remains insufficient to recommend prolongation of therapy beyond the immediate perioperative window, while also highlighting the paucity of data on optimal agent selection in penicillin-allergic patients.[5, 12] A 2025 retrospective analysis of 100 consecutive orthognathic cases from Chile explicitly framed AP choice around contemporary microbial resistance patterns, reporting that intravenous cefazolin (or clindamycin in penicillin-allergic patients) combined with standardised perioperative hospitalisation produced acceptable SSI rates, while cautioning that clindamycin resistance among isolates from infected cases warrants closer surveillance.[10,13] Finally, the prospective outpatient-setting study by Pekkari et al. demonstrated that orthognathic surgery can be performed safely in ambulatory settings with appropriately timed single-dose prophylaxis, without an excess of infectious complications compared with inpatient cohorts.[9,14]

Table 1. Summary of key studies evaluating antibiotic prophylaxis (AP) in orthognathic surgery. SR = systematic review; MA = meta-analysis; SSI = surgical site infection.

Study (ref.)	Design	Population/setting	Antibiotic regimen evaluated	Key finding
Brignardello-Petersen et al., 2015 [3]	Cochrane SR/MA	RCTs of orthognathic surgery, multiple countries	Perioperative vs. no antibiotic/placebo; varying durations	Perioperative antibiotics reduce SSI vs. placebo; insufficient evidence for extended duration
Naimi-Akbar et al., 2018 [2]	Complex SR (AMSTAR/GRADE)	6 SRs + 14 primary studies	Mixed regimens, single dose vs. 24-h	AP reduces infection but primary evidence largely low quality; no consensus on agent/duration
Gil et al., 2021 [5]	Overview of SRs	Multiple SRs on orthognathic AP	Perioperative vs. prolonged courses	Perioperative AP supported; no added benefit demonstrated for prolongation
Posnick et al., 2017 [8]	Retrospective cohort	Bimaxillary orthognathic, osseous genioplasty, intranasal procedures (USA)	Institutional perioperative protocol	Procedure- and patient-specific risk factors identified independent of AP duration
Naros et al., 2023 [6]	Retrospective cohort, n=291	Orthognathic surgery, Germany	92% single intraoperative dose	SSI risk driven by smoking, prior surgery, operative time, drains; not by AP duration
Pekkari et al., 2023 [9]	Prospective cohort	Outpatient orthognathic surgery, Sweden	Single-dose perioperative AP	Ambulatory orthognathic surgery safe with single-dose AP; low complication rate
Tang, Wen & Yang, 2023 [7]	SR/MA of RCTs to Sept 2023	8 RCTs (long vs. short); 3 RCTs (single-day vs. single dose)	Long-term (≥2 days) vs. short-term (1 day); single-day vs. single preoperative dose	No reduction in SSI with prolongation beyond 1 day or beyond a single dose
Solé et al., 2025 [10]	Retrospective cohort, n=100	Orthognathic surgery, Chile	IV cefazolin (or clindamycin if penicillin-allergic), 3-day inpatient course	Acceptable SSI rates; clindamycin resistance flagged as emerging concern

3.3 Antibiotic prophylaxis in mandibular fracture and maxillofacial trauma surgery

The evidence base for AP in mandibular fracture surgery is both larger and more contentious than for orthognathic surgery, reflecting decades of debate over whether postoperative antibiotics confer any benefit beyond perioperative dosing. The 2021 systematic review and meta-analysis by Dawoud et al., registered with PROSPERO and conducted according to PRISMA guidance, screened 280 records and included 98 studies in the final analysis; it concluded that prophylactic antibiotics are recommended for comminuted mandibular fractures and certain other high-risk procedures, but that the evidence for prolonged postoperative courses remains weak.[14] This aligns with the 2019 meta-analysis by Habib et al., which found that adding postoperative antibiotics to standard perioperative prophylaxis did not significantly reduce SSI in patients undergoing surgery for maxillofacial trauma (pooled RR approximately 1.11), including in the mandibular fracture subgroup specifically.[12]

The 2020 meta-analysis by Delaplain et al. similarly found no reduction in SSI with postoperative antibiotics regardless of duration or anatomical site, reporting odds ratios close to unity and crossing 1 when comparing perioperative-only with postoperative antibiotics, and when comparing standard-duration with extended (>72-hour) postoperative regimens.[13] The 2023 Laryngoscope review by Harryman, Park, and Oyer synthesised these and other meta-analyses-collectively incorporating data from over 50 separate studies-and concluded that the literature supports conservative, judicious use of prophylactic antibiotics in mandibular trauma, with the strongest (though still weak) evidence favouring preoperative dosing specifically for comminuted or compound fractures involving a tooth-bearing segment or exposed bone.[15] The Surgical Infection Society's 2021 guidelines for traumatic facial fractures echo this conservative stance, recommending against routine extended postoperative prophylaxis for most facial fracture categories.[11] . Prospective RCT evidence specifically addressing duration has continued to accumulate. The 2024 trial by Rikhotso and Mohotlhoane randomised 77 patients undergoing open reduction and internal fixation of mandibular fractures to a standard perioperative antibiotic regimen versus an extended postoperative course an additional 5 days of oral antibiotics, finding no statistically significant difference in infection rates between groups at 1, 4, and 6 weeks postoperatively-further reinforcing that extended prophylaxis offers limited additional protection while increasing cumulative antibiotic exposure.[16].

Table 2. Summary of key studies evaluating antibiotic prophylaxis (AP) in mandibular fracture and maxillofacial trauma surgery. SR = systematic review; MA = meta-analysis; ORIF = open reduction and internal fixation; SIS = Surgical Infection Society; RR/OR = risk/odds ratio.

Study (ref.)	Design	Scope	Comparison evaluated	Key finding
Habib et al., 2019 [12]	SR/MA	Facial fractures incl. mandible, midface, orbit	Postoperative AP added to standard prophylaxis vs. standard alone	No significant reduction in SSI with added postoperative AP (pooled RR ≈ 1.11)
Delaplain et al., 2020 [13]	SR/MA	Facial fractures (ORIF), 16 mandibular-fracture studies	Perioperative vs. postoperative; standard vs. extended (>72 h)	No reduction in SSI with postoperative or extended AP (ORs crossing 1)
Dawoud et al., 2021 [14]	PRISMA-registered SR/MA	98 studies on mandibular fracture management	AP vs. no AP; duration comparisons	AP recommended for comminuted fractures; weak evidence for prolonged courses
Forrester et al., 2021 [11]	SIS clinical guideline	Traumatic facial fractures (all sites)	Pre-, peri-, and postoperative AP by fracture type	GRADE-based recommendations against routine extended postoperative AP
Harryman, Park & Oyer, 2023 [15]	Narrative synthesis of 50+ studies	Mandible fractures	Pre-/peri-/postoperative AP, by fracture pattern	Conservative AP use endorsed; preoperative dosing may help in comminuted/compound fractures
Rikhotso & Mohotlhoane, 2024 [16]	Prospective RCT, n=77	ORIF of mandibular fractures, South Africa	Standard perioperative AP vs. perioperative + 5-day extended oral course	No significant difference in infection rates at 1, 4, or 6 weeks

Taken together, the orthognathic and trauma literatures converge on a similar message: perioperative antibiotic administration-typically a single preoperative dose, occasionally repeated intraoperatively for prolonged procedures-provides the principal infection-prevention benefit, while extension of prophylaxis into the postoperative period, whether for one additional day or for several days, has not been consistently shown to reduce SSI further, regardless of whether the surgery is elective orthognathic or trauma-related (mandibular fracture fixation).

3.4 Antimicrobial resistance in maxillofacial infections: the Iraqi context

The applicability of the international evidence summarised above depends critically on the local susceptibility of pathogens to the antibiotics recommended. Akram et al. characterised the bacteriology and antimicrobial susceptibility of isolates obtained from post-maxillofacial surgical infections across dental and surgical centres in Baghdad, Iraq.[17] Staphylococcus aureus and Prevotella buccalis were the most frequently isolated organisms, alongside viridans group *streptococci, Klebsiella pneumoniae, Peptostreptococcus*

species, and Porphyromonas gingivalis. Resistance rates were strikingly high for several agents historically used in perioperative prophylaxis: penicillin (65.8%), tetracycline (61.3%), gentamicin (58.1%), and ampicillin (57.6%), whereas linezolid (25.7%), ceftriaxone (31.1%), and azithromycin (31.1%) showed comparatively lower resistance (Figure 2).[17]

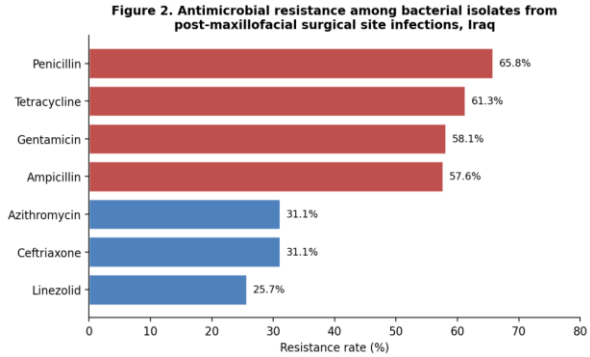

Figure 2. Antimicrobial resistance rates among bacterial isolates from post-maxillofacial surgical site infections in Iraq. Data derived from Akram et al., 2022.[17]

These findings have direct implications for the international recommendations summarised in Tables 1 and 2. Internationally favoured first-line prophylactic agents-amoxicillin-clavulanate, ampicillin-based regimens, and (to a lesser extent) clindamycin-rely on susceptibility profiles that may not hold in the Iraqi clinical microbiome, particularly given the very high penicillin and ampicillin resistance reported.[17, 18] While cefazolin (a first-generation cephalosporin) remains a reasonable default in many international protocols, including the recent Chilean cohort,[10] local susceptibility data for cephalosporins specifically in Iraqi maxillofacial isolates remain limited, underscoring the need for periodic local antibiogram-based surveillance rather than reliance on international defaults alone.

3.5 Antibiotic prescribing patterns among Iraqi dentists and dental trainees

The high background resistance documented above is mirrored by-and likely partly driven by-prescribing behaviour. In a 12-governorate survey of 481 Iraqi dentists, Al Marah et al. found that the proportions of correct and incorrect antibiotic prescribing patterns across various oral and dental conditions were nearly equal (49.6% vs. 50.4%), with amoxicillin and amoxicillin-clavulanate Augmentin the most frequently prescribed agents, and azithromycin the most common alternative for penicillin-allergic patients.[18] Notably, a substantial proportion of dentists reported prescribing antibiotics for acute periapical infection-a condition not generally requiring systemic antibiotics in the absence of systemic signs-while correct prescribing was significantly associated with specialist qualification and academic practice setting.[18]

A complementary cross-sectional survey of 280 dentists in Kirkuk Governorate by Mahdi and Ibrahim found that more than half of respondents (56.8%) used antibiotics for both empirical and direct therapy, while a substantial minority (43.2%) reported insufficient knowledge regarding antibiotic group selection for empirical therapy, and over a third recommended broad-spectrum agents by default.[19] At the educational level, the 2026 multi-institutional study by Al-Hasani et al., surveying 569 Iraqi dental students and interns across multiple universities, found generally strong theoretical knowledge of antibiotics and good awareness of antimicrobial stewardship principles; however, a consistent gap between this knowledge and self-reported clinical practice was identified, with limited access to prescribing guidelines and variable institutional support cited as key barriers to translating knowledge into stewardship-concordant prescribing.[20].

Table 3. Summary of studies characterising antimicrobial resistance and antibiotic prescribing behaviour relevant to oral and maxillofacial infections in Iraq. SSI = surgical site infection.

Study (ref.)	Population	Setting	Key prescribing/resistance findings
Akram et al., 2022 [17]	Bacterial isolates from post-maxillofacial SSIs	Baghdad, Iraq	S. aureus and P. buccalis most prevalent; resistance 57.6–65.8% to first-line agents (penicillin 65.8%, tetracycline 61.3%, gentamicin 58.1%, ampicillin 57.6%); lowest resistance to linezolid, ceftriaxone, azithromycin
Al Marah et al., 2022 [18]	481 dentists	12 Iraqi governorates	~50% of prescribing patterns non-concordant with recommendations; amoxicillin/Augmentin preferred; over-prescribing for acute periapical infection
Mahdi & Ibrahim, 2023 [19]	280 dentists	Kirkuk Governorate, Iraq	56.8% use antibiotics for empirical/direct therapy; 43.2% report inadequate knowledge of empirical antibiotic selection; >35% default to broad-spectrum agents
Al-Hasani et al., 2026 [20]	569 dental students/interns	Multiple Iraqi universities	Strong theoretical knowledge and stewardship awareness, but persistent knowledge-practice gap; limited guideline access cited as barrier

3.6 Non-antibiotic adjuncts and stewardship interventions

Beyond systemic AP, several non-antibiotic measures contribute to infection prevention and reduce reliance on antimicrobials. The broader dental antimicrobial stewardship literature, recently updated by Teoh et al. in a systematic review of stewardship interventions across dental settings, found that structured interventions-audit and feedback, prescriber education, and electronic decision-support linking diagnosis to prescription-can measurably improve guideline concordance, though implementation across whole health systems (including dentistry) remains inconsistent even in well-resourced settings.[1] Similarly, Salgado-Peralvo et al.'s systematic review of survey-based studies on antibiotic prescribing for dental implant placement across Europe found wide inter-country variation in prophylactic prescribing despite broadly similar guideline recommendations, illustrating that prescribing culture-not merely evidence availability-is a major determinant of practice [20]. In the OMFS context specifically, optimised surgical technique (minimising operative time, achieving tension-free primary closure, and judicious use of drains), strict aseptic protocols, and perioperative chlorhexidine mouth rinses are widely regarded as important adjuncts that reduce the bacterial load at the surgical site independent of systemic antibiotic exposure, and several of studies reviewed here identified operative time and drain placement-rather than antibiotic duration-as independent predictors of SSI.[6,8].

4. Discussion

This review synthesises two strands of evidence that are rarely considered together: high-quality international data on the efficacy and optimal duration of antibiotic prophylaxis in jaw surgery, and locally generated data on antimicrobial resistance and prescribing behaviour in Iraq. The international evidence is reasonably convergent: across both orthognathic surgery and mandibular fracture/maxillofacial trauma surgery [16], perioperative-typically single-dose-antibiotic prophylaxis appears to capture most of the achievable reduction in SSI risk, while extension of prophylaxis into the postoperative period, whether for 24 hours or several days, has not been consistently shown to provide additional benefit and may instead increase the risk of adverse drug effects, Clostridioides difficile infection, and selection for resistant organisms. However, the translation of

these findings into the Iraqi context is not straightforward. First, the susceptibility profile of organisms recovered from Iraqi maxillofacial infections diverges substantially from the assumptions underlying many international protocols: penicillin and ampicillin resistance reached 65.8% and 57.6%, respectively,[17] the effectiveness of an amoxicillin-based single-dose regimen if extrapolated uncritically. Additionally, the adoption and implementation of any evidence-based protocols depend on prescriber practices, and Iraqi survey data have always shown that prescribing practices deviate from international recommendations in terms of over-prescribing antibiotics without indications [18], use of broad-spectrum antibiotics in situations where culture is not available for guidance [19], and a knowledge-practice gap despite well-informed dental practitioners [20].

Both findings work hand in hand; they are not independent but rather reinforce each other in that prescribing practices favouring the use of broad spectrum antibiotics, combined with long treatment courses, in patients who already suffer from resistance to first-line treatments, make the effectiveness of empirical prophylaxis less likely as the days go by – exactly the problem identified by Akram et al. [1,17]. Addressing the problem will need efforts in both aspects, namely adopting the protocol of using short duration therapy, including using single doses whenever possible, based on internationally-accepted evidence (with the additional benefit of lowering antibiotic exposure), coupled with investments in local microbiology and prescriber education programs [20] A pragmatically modified approach could be:

(i) Preoperative administration of a single dose of either a first generation cephalosporin (e.g., cefazolin) or amoxicillin-clavulanate for all orthognathic surgery and mandibular fractures based on local resistance profiles and not just on the internationally recommended default;

(ii) Using clindamycin only as an alternative in patients with penicillin allergies, while being mindful of reports of clindamycin resistance.[10]

(iii) Intra-operative redosing if surgery exceeds certain duration cut-offs according to principles of generalized surgical prophylaxis;

(iv) Avoiding use of post-operative antibiotics beyond 24 hours after surgery, except under specific conditions (e.g., gross comminuted or compound fractures with exposed bone).[14,15]

(v) Chlorhexidine mouth-rinses and careful surgical technique as additional measures minimizing the need for prophylactic antibiotics.[6,8] and (vi) Periodic review of local antibiograms at major Iraq maxillofacial centers, informing the development of national/institutional guidelines. Several limitations should be acknowledged. The Iraq-specific evidence base remains limited in volume: the AMR data presented here derive predominantly from a single multi-centre Baghdad study,[17] and prescribing surveys, while informative, rely on self-report and may be subject to social-desirability bias.[18,19,20] This dependence on a small number of local sources — most notably the single multi-centre Baghdad antibiogram study by Akram et al. [17] — means that the Iraqi resistance estimates cited throughout this review should be regarded as preliminary and not necessarily nationally representative. There is consequently a pressing need for larger, multi-centre national antimicrobial-resistance surveillance programmes and for additional high-quality, locally conducted investigations to confirm these patterns before firm, nationally generalisable prophylaxis recommendations can be issued. No Iraqi RCTs directly comparing AP regimens for orthognathic or mandibular fracture surgery were identified, meaning that the recommendations offered here necessarily extrapolate international trial evidence to a local resistance context-

an extrapolation that, while reasoned, cannot substitute for direct local trial data. Additionally, the heterogeneity of outcome definitions (SSI, wound dehiscence, "complications" more broadly) across the included studies limits direct quantitative pooling, and this review therefore adopted a narrative rather than meta-analytic synthesis. Finally, as with any rapidly evolving field, newer studies-including ongoing prospective trials such as the UK MANTRA collaborative study on postoperative antibiotics in mandibular trauma-may refine or revise the conclusions presented here.

5. Conclusions and Recommendations

Antibiotic prophylaxis remains an important, evidence-supported component of infection prevention in jaw surgery, but the weight of recent international evidence favours short-duration, predominantly single-dose perioperative regimens over prolonged postoperative courses, for both elective orthognathic surgery and mandibular fracture fixation. In Iraq, however, this evidence must be applied cautiously: documented resistance rates exceeding 57% (and reaching 65.8% for penicillin) to several conventional first-line agents, combined with prescribing patterns that frequently favour broad-spectrum or prolonged regimens, create a setting in which empirical, internationally derived protocols may underperform unless adapted to local microbiology. We recommend that Iraqi maxillofacial and dental institutions: (1) adopt short-duration (ideally single-dose) perioperative prophylaxis as the default for orthognathic and mandibular fracture surgery, reserving extended courses for clearly defined high-risk indications; (2) establish or expand local antibiogram surveillance for maxillofacial pathogens to guide first-line agent selection; (3) integrate structured antimicrobial stewardship education-addressing the knowledge-practice gap identified among Iraqi dental trainees[20]-into both undergraduate curricula and continuing professional development; and (4) prioritise the design of locally conducted RCTs comparing prophylaxis regimens, which remain notably absent from the current evidence base. Such measures would align Iraqi practice with international evidence on infection prevention while safeguarding the future effectiveness of the antimicrobial agents on which that prevention depends.

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