



Original Article

System-Level Capacity Optimization to Eliminate Dental Treatment Waiting Lists: Bed Management–Led Quality Improvement Study

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ABSTRACT

To evaluate the impact of a bed management–led, multidisciplinary capacity optimization initiative on reducing a prolonged waiting list for hospital-based dental treatment under GA. This single-center quality improvement study was conducted in a tertiary hospital. All patients on the existing waiting list were reviewed; no sampling was performed. Baseline capacity allowed treatment of two patients per week, comprising one day-case and one inpatient admission. The intervention included waiting-list validation, formation of a multidisciplinary taskforce, optimization of weekday scheduling, increased cases per theater, and structured weekend surgical sessions supported by overtime staffing. Primary outcomes were weekly treatment throughput, waiting-list reduction and clearance, cancellations, and major safety outcomes. Descriptive statistics were used. Of 190 patients initially listed, 99 (52.1%) remained eligible after validation. Weekly throughput increased from 2 to 12 patients, representing an absolute increase of 10 patients, a 500% relative increase, and a rate ratio of 6.0. Within two months, 96 patients completed treatment and 3 patients (3.0%) were cancelled. No major anesthesia-related complications, intensive care unit transfers, or deaths were reported. The validated waiting list was eliminated within two months without capital investment or infrastructure expansion. A bed management–led operational redesign substantially increased dental GA throughput and eliminated a prolonged validated waiting list within a short period. Strategic OR utilization, coordinated bed allocation, regular waiting-list validation, and multidisciplinary collaboration may improve access to hospital-based dental GA services without permanent infrastructure expansion.

Keywords: Dental general anesthesia, Waiting list management, Operating room utilization, Bed management, Healthcare capacity, Quality improvement

Introduction

Dental treatment under general anesthesia is essential for selected patients with complex medical conditions, special healthcare needs, or limited ability to tolerate conventional dental procedures. In hospital-based systems, however, access to dental GA may be restricted because dental services compete with other surgical specialties for OR time, anesthesia resources, nursing support, and inpatient bed allocation [1, 2].

Prolonged waiting periods may result in progression of dental disease, recurrent infection, repeated outpatient consultations, emergency department visits, and deterioration in oral health and quality of life. Although delays are often attributed to limited infrastructure, inefficiencies in scheduling, patient-list maintenance, coordination, and resource allocation may also substantially limit effective capacity [3-5].

The present quality improvement study describes a bed management–led, multidisciplinary intervention designed to address a prolonged waiting list for hospital-based dental treatment under GA. The intervention focused on

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validating the existing waiting list, improving coordination among relevant clinical and operational departments, optimizing weekday OR use, and introducing structured weekend surgical sessions [2, 6].

Aims of the study

The primary aim of this study was to evaluate the effect of a bed management–led, multidisciplinary capacity optimization initiative on reducing a prolonged waiting list for dental treatment under general anesthesia.

The specific objectives were to:

- validate the existing waiting list and determine the number of patients who remained eligible for treatment;
- increase weekly dental GA treatment capacity through optimization of OR scheduling and bed allocation;
- measure changes in treatment throughput before and after the intervention;
- evaluate waiting-list clearance, treatment cancellations, and major safety outcomes; and
- describe the operational and potential economic implications of the intervention.

Materials and Methods

Study design and setting

This was a single-center quality improvement initiative conducted in a tertiary hospital. A structured operational redesign framework was used to address a prolonged waiting list for comprehensive dental treatment under GA. All patients present on the waiting list were included in the review, and no sampling was performed [6].

Baseline assessment

At baseline, the waiting list comprised 190 patients awaiting comprehensive dental treatment under GA. Existing capacity permitted treatment of two patients per week: one patient in a day-case theater and one patient requiring inpatient admission. Under this baseline capacity, clearance of the original list was projected to require approximately 95 weeks, or about 7.5 years. The principal operational limitations were staffing shortages and fragmented scheduling coordination.

Intervention

The intervention was led by the Director of Bed Management and implemented in three phases.

Phase 1: Waiting-list validation

A structured review of all patients on the waiting list was performed to remove duplicate entries, identify inactive cases, verify the clinical indication for treatment, and confirm medical fitness. Following this process, 99 patients remained eligible for treatment.

Phase 2: Multidisciplinary coordination

A multidisciplinary taskforce was established and included representatives from dental surgery, anesthesia, internal medicine, nursing leadership, OR scheduling, bed management, and hospital administration. Structured scheduling and capacity forecasting were used to improve coordination and resource utilization.

Phase 3: OR capacity optimization

Executive approval was obtained to optimize weekday OR scheduling, increase the number of cases treated per theater, introduce weekend surgical sessions, and provide structured overtime compensation. Post-intervention capacity consisted of two patients per weekday theater and weekend sessions accommodating four inpatient admissions on Friday and four on Saturday. Total weekly capacity increased to 12 patients, comprising 10 inpatient admissions and 2 day cases.

Outcome Measures and statistical analysis

The primary operational outcome was weekly treatment throughput. Secondary outcomes included reduction and clearance of the validated waiting list, treatment cancellations, and major safety outcomes, including major anesthesia complications, ICU transfers, and mortality. Descriptive statistics were used. The percentage increase in throughput was calculated as $((12 - 2) / 2) \times 100 = 500\%$, and the rate ratio was calculated as $12 / 2 = 6.0$. Because this was a complete-population quality improvement initiative, inferential statistical testing was not performed.

Results and Discussion

Waiting-list validation

Of the 190 patients initially present on the waiting list, 99 (52.1%) remained eligible after validation. Thus, 91 patients (47.9%) were removed from the active list because of duplicate records, inactive status, lack of ongoing indication, or other factors identified during review.

Table 1. Waiting list validation with their parameters and values

Parameter	Value	Percentage
Original waiting list	190 patients	100%
Validated waiting list	99 patients	52.1%
Reduction after validation	91 patients	47.9%

Operating room utilization

Table 2. Operating room utilization with parameters

Parameter	Pre-intervention	Post-intervention	Absolute change	Relative change
Day-case cases/week	1	2	+1	+100%
Inpatient admissions/week	1	10	+9	+900%
Total cases/week	2	12	+10	+500%
Monthly capacity (approx.)	8	48	+40	+500%
Weekend OR sessions	0	2	+2	—
Rate ratio	—	6.0	—	—

Average cases per OR day increased from 1.0 before the intervention to 3.0 after the intervention.

Waiting-list clearance

Within two months of implementation, 96 patients completed treatment. Three patients (3.0%) were cancelled, and the validated waiting list was fully eliminated. Compared with the approximately 7.5-year projected clearance time under baseline capacity, the validated backlog was resolved within two months.

Cancellations and safety

Table 3. Cancellations and safety with outcomes and values

Outcome	Value
Total cancellations	3 (3.0%)
Medical instability	2
Consent refusal	1
Major anesthesia complications	0
ICU transfers	0
Mortality	0

Cost and operational impact

The intervention required overtime compensation for surgical, anesthesia, and nursing personnel, weekend staffing differentials, and extended support services. No capital expenditure, infrastructure expansion, or equipment purchase was required. Fixed institutional costs associated with existing OR infrastructure, utilities, and administrative overhead remained unchanged. Because treatment throughput increased substantially without additional fixed infrastructure, the intervention was expected to improve average cost efficiency by distributing fixed costs across a larger number of treated patients.

Potential downstream benefits included avoidance of repeated outpatient consultations, emergency department visits, hospital admissions for odontogenic infection, antibiotic prescriptions, and disease progression requiring more complex treatment. These downstream effects were not formally quantified and should therefore be interpreted as potential rather than measured economic benefits.

This quality improvement study demonstrated that a prolonged waiting list for dental treatment under GA could be addressed through operational redesign without permanent expansion of hospital infrastructure. The intervention increased weekly throughput from 2 to 12 patients, corresponding to a sixfold increase in capacity, and enabled elimination of the validated waiting list within two months.

A major finding was the effect of systematic waiting-list validation. Nearly half of the original entries were no longer eligible for active scheduling. This highlights the importance of regular auditing of long waiting lists, particularly in services where clinical status, medical fitness, treatment requirements, or patient availability may change over time. Accurate waiting-list data are essential for realistic capacity planning [6, 7].

The multidisciplinary nature of the intervention was also central to the observed improvement. Dental surgery, anesthesia, internal medicine, nursing leadership, OR scheduling, bed management, and hospital administration were coordinated through a structured operational approach. This reduced fragmentation and allowed existing resources to be allocated more efficiently [2, 8].

Weekend surgical sessions and increased case density per theater were used to expand capacity. Importantly, the improvement was achieved without capital investment or permanent infrastructure expansion. The principal additional inputs were temporary labor and staffing costs. Although a formal cost-effectiveness analysis was not performed, the increased throughput and avoidance of new infrastructure suggest that operational optimization may offer an efficient strategy for managing surgical backlogs [2, 9].

The safety findings were also favorable. Among the 99 validated patients, no major anesthesia complications, ICU transfers, or deaths were reported during the intervention period. However, the short follow-up period and absence of a comparator group mean that long-term safety and sustainability cannot be established from this study alone [1, 8].

Several limitations should be considered. First, this was a single-center quality improvement initiative, which may limit generalizability to hospitals with different staffing models and resources. Second, the follow-up period was short. Third, no formal cost-effectiveness analysis was conducted. Fourth, patient-reported outcomes were not measured. Finally, the sustainability of the increased capacity beyond the intervention period was not assessed. Future studies should evaluate long-term operational sustainability, clinical outcomes, patient satisfaction, and formal economic impact.

Conclusion

A bed management–led, multidisciplinary operational redesign increased dental treatment throughput under general anesthesia from 2 to 12 patients per week, representing a 500% increase and a rate ratio of 6.0. The intervention eliminated a prolonged validated waiting list within two months, with a low cancellation rate and no reported major anesthesia complications, ICU transfers, or deaths. Regular waiting-list validation, coordinated bed allocation, optimized OR scheduling, and targeted weekend capacity may represent practical strategies for improving access to hospital-based dental GA services without capital expansion. Further research is needed to assess long-term sustainability, patient-reported outcomes, and formal cost-effectiveness.

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References

1. Dougherty N. The dental patient with special needs: a review of indications for treatment under general anesthesia. *Spec Care Dentist*. 2009;29(1):17-20. doi:10.1111/j.1754-4505.2008.00057.x
2. Voytus ML. Evaluation, scheduling, and management of dental care under general anesthesia for special needs patients. *Dent Clin North Am*. 2009;53(2):243-54. doi:10.1016/j.cden.2008.12.018

3. Badre B, Serhier Z, El Arabi S. Waiting times before dental care under general anesthesia in children with special needs in the Children's Hospital of Casablanca. *Pan Afr Med J.* 2014;17:298. doi:10.11604/pamj.2014.17.298.2714
4. Okuji DM, Lin J. Predicting negative outcomes while awaiting dental treatment under general anesthesia. *J Dent Child (Chic).* 2021;88(1):3-10.
5. World Health Organization. Sugars and dental caries. Geneva: World Health Organization; 2017.
6. Casas MJ, Kenny DJ, Barrett EJ, Brown L. Prioritization for elective dental treatment under general anesthesia. *J Can Dent Assoc.* 2007;73(4):321.
7. Chung SS, Casas MJ, Kenny DJ, Barrett EJ. Clinical relevance of access targets for elective dental treatment under general anesthesia in pediatrics. *J Can Dent Assoc.* 2010;76:a116.
8. Wang YC, Lin IH, Huang CH, Fan SZ. Dental anesthesia for patients with special needs. *Acta Anaesthesiol Taiwan.* 2012;50(3):122-5. doi:10.1016/j.aat.2012.08.009
9. Al Askar BA, AlBishry FY, Alotaibi NM, Alzaben A, Albishi SM, Almajed AA, et al. Experience of special care patients receiving dental rehabilitation under general anesthesia at King Saud University Dental University Hospital. *Sci Rep.* 2025;15(1):33493. doi:10.1038/s41598-025-16763-2