

Digital NAM: Reducing Treatment Burden in Cleft Care

Category: Digital Excellence

Focus Area: Telemedicine and virtual care delivery models

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Problem Statement / Digital Challenge

Infants with cleft lip and palate undergoing conventional Nasoalveolar Molding (NAM) require frequent hospital visits for appliance adjustments and monitoring. Many families travel long distances from rural and underserved areas to access specialized cleft services, resulting in significant financial, logistical, and emotional burden. Repeated visits often lead to missed appointments, treatment interruptions, and reduced compliance, particularly during the first few months of life when regular follow-up is critical.

The traditional NAM process is highly dependent on chairside modifications by specialists, limiting access to care and increasing demands on clinical resources. Caregivers face challenges balancing travel, accommodation expenses, loss of workdays, and infant care requirements.

A digital solution was required to reduce dependence on frequent in-person visits while maintaining clinical effectiveness and specialist supervision. The stakeholders most affected were patients and caregivers, as well as clinicians managing long-term follow-up and treatment coordination.

The initiative aimed to improve accessibility, continuity of care, treatment compliance, caregiver convenience, and service efficiency. Key NABH quality

aspects impacted included patient-centred care, accessibility of services, continuity

of care, timeliness of treatment, effective communication, and overall patient experience.

Digital Tool / Solution Implemented

A fully digital Nasoalveolar Molding (NAM) workflow was developed in-house using intraoral scanning, virtual treatment planning, CAD/CAM technology, and sequential aligner-based molding appliances. Digital treatment simulations were used to design multiple customized appliances in advance according to planned treatment stages.

The solution enabled parents to replace appliances at home based on a predefined schedule, reducing the need for frequent hospital visits. Clinical progress was monitored through scheduled teleconsultations and periodic in-person reviews.

Key features included digital patient records, virtual treatment planning, customized appliance design, remote follow-up, telemedicine-based monitoring, and standardized treatment protocols. The digital workflow improved care accessibility, enhanced treatment continuity, reduced travel burden, and optimized clinician time while maintaining treatment effectiveness.

Digital Implementation Highlight

The case transformed a traditionally hospital-dependent cleft care process into a hybrid virtual care model. By combining digital treatment planning with teleconsultation-based follow-up, a significant portion of care was shifted from the

hospital to the patient's home. Sequential appliances were fabricated before treatment initiation, enabling uninterrupted therapy with fewer physical visits. The model improved access to specialist cleft care for families from remote regions, reduced caregiver burden, and established a scalable framework for telemedicine-supported infant orthopedic treatment.

Digital Impact

The digital NAM workflow significantly improved the delivery of cleft care by reducing dependence on frequent hospital visits for appliance adjustment and monitoring. Pre-planned CAD/CAM-manufactured sequential appliances enabled treatment continuity with fewer in-person appointments, resulting in reduced travel time, lower out-of-pocket expenses, and improved caregiver convenience.

Operationally, the solution optimized clinician time by minimizing repetitive chairside modifications and standardizing treatment planning. Digital records and virtual treatment monitoring improved documentation, communication, and follow-up coordination.

From a quality perspective, the initiative enhanced continuity of care, reduced the risk of treatment interruption, and improved patient adherence through structured remote follow-up. Teleconsultation enabled timely clinical review and early identification of concerns, supporting safer and more efficient care delivery.

The case aligns with NABH digital health principles by promoting patient-centred care, digital documentation, telemedicine-enabled service delivery, accessibility of

specialized services, and continuity of care. The model demonstrates how digital transformation can improve healthcare quality while expanding access to vulnerable patient populations.

Key Enablers / Innovations

The success of the initiative was driven by the integration of intraoral scanning, virtual treatment planning, CAD/CAM manufacturing, and telemedicine-based follow-up into a single care pathway. Strong collaboration between cleft surgeons, orthodontists, digital design teams, and caregivers enabled seamless implementation.

A key innovation was the replacement of repeated chairside appliance modifications with a series of digitally designed sequential appliances fabricated before treatment initiation. This transformed NAM from a hospital-dependent procedure into a partially home-based treatment supported by remote specialist supervision.

Challenges included caregiver education regarding appliance replacement, establishing reliable virtual follow-up protocols, and ensuring treatment compliance outside the hospital setting. These challenges were addressed through structured caregiver training, standardized treatment protocols, and scheduled teleconsultation reviews.

The case demonstrates how digital technologies can improve access, efficiency, and patient experience without compromising clinical effectiveness.

Key Learnings & Sustainability

Key Learnings:

1. Digital treatment planning combined with telemedicine can successfully reduce treatment burden while maintaining clinical oversight.
2. Caregiver engagement and education are critical for successful implementation of home-based treatment protocols.
3. Standardized digital workflows improve treatment consistency, scalability, and resource utilization.

Sustainability:

The model is sustainable because digital appliance design and teleconsultation can be incorporated into routine cleft care without significant recurring infrastructure requirements. The workflow reduces unnecessary hospital visits and optimizes specialist time, supporting long-term operational efficiency.

Recommendations for Other Hospitals:

Hospitals adopting similar practices should invest in digital treatment planning capabilities, establish clear telemedicine protocols, and prioritize caregiver training. A multidisciplinary approach and robust follow-up system are essential for ensuring successful implementation and maintaining treatment quality.

It may include teleconsultation pathways, patient journey maps, and outcome comparisons between conventional and digital NAM protocols.

Reference Sources (If Applicable)

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