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Mini Review

Rehabilitation with Dental Prosthetics: A Social and Scientific Problem

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Abstract

Introduction: Dental prosthetic rehabilitation constitutes a fundamental element for quality of life, particularly among vulnerable populations. In resource-limited settings, guaranteeing these right faces multidimensional challenges requiring integrated analysis from scientific and social perspectives.

Objective: This study aims to describe the complex scientific and social challenges in prosthetic rehabilitation provision within the Cuban system, while documenting the resilience strategies developed to sustain equitable access to these essential services.

Development: The scientific dimension presents significant challenges due to shortages of advanced materials like zirconia or titanium, coupled with limitations in cutting-edge digital technologies such as CAD/CAM systems. This scarcity notably restricts available therapeutic options. Although promising research exists on local biomaterials like synthetic hydroxyapatite, innovation processes are hindered by difficulties in accessing updated international scientific literature. Concurrently, social challenges include prolonged waiting lists (often extending for years), uneven geographical coverage with marked disadvantages in rural areas, and migration of qualified technical personnel. These barriers disproportionately impact vulnerable groups-especially older adults-compromising masticatory function, nutritional status, mental health, and social inclusion. Faced with this scenario, resilience strategies have prioritized low-cost removable prostheses, utilized validated national biomaterials, strengthened prosthetic workshops in community polyclinics, and established cooperative alliances with universities and non-governmental organizations.

Conclusion: Prosthetic rehabilitation must be consolidated as a social right through policies integrating local innovation, sustainable professional training, and unrestricted international cooperation. There is urgent need to systematically document the human impact of untreated tooth loss and optimize existing resources through evidence-based strategies.

Keywords: Dental prosthetic rehabilitation; Oral health equity; Oral health in vulnerable populations; Innovation in resource-limited contexts; Health system resilience

Introduction

Dental prosthetic rehabilitation represents an essential pillar of the right to oral health, particularly where severe tooth loss compromises basic functions like mastication and communication, profoundly affecting human dignity [1]. In Cuba, this service is delivered through a universal public healthcare system that nonetheless confronts complex challenges stemming from structural economic limitations, restricted access to global supplies, and persistent aftermath of recent health emergencies [2]. This reality creates a significant paradox: while dental professionals' training maintains internationally recognized academic standards, material barriers progressively hinder the provision of timely, acceptable-quality prostheses [3]. The central objective of this research is to critically analyze these intertwined challenges through their scientific and social dimensions, while simultaneously identifying the adaptive strategies developed by the system to preserve equitable access.

Development

Scientific dimension: Innovation in adverse contexts

Cuba possesses a solid tradition in dental education, supported by prestigious academic institutions like the Faculty of Dentistry of Havana [3] and throughout its provinces. This human capital has enabled development of local alternatives including indigenous biomaterials-such as synthetic hydroxyapatite and cobalt-chromium alloys [4] prioritizing accessible techniques like removable acrylic prostheses requiring minimal technological infrastructure [3].

Nevertheless, critical gaps persist that constrain scientific advancement: access to modern materials like zirconia or titanium remains exceptional; essential digital technologies (CAD/CAM, 3D printing) suffer widespread scarcity; and numerous laboratories operate with obsolete equipment compromising technical precision [3,5]. Compounding this is disconnection from global scientific networks, substantially impeding endogenous innovation and international validation of local advances [5].

Social dimension: Equity under pressure

Although Cuba's healthcare system theoretically guarantees universal coverage [2] through specialized programs for older adults and persons with disabilities [3], systemic barriers emerge in practical implementation. Protracted waiting lists-frequently exceeding two years, inconsistent prosthesis quality (predominantly basic options over customized solutions), insufficient rural coverage, and increasing migration of qualified prosthetic technicians collectively form a critical landscape [3].

This situation has spawned unregulated informal markets where prostheses of questionable quality are commercialized, exposing patients to biocompatibility and safety risks [3]. The human consequences are tangible: progressive nutritional deterioration from masticatory deficiencies, social isolation due to aesthetic stigma associated with edentulism, and diminished self-esteem affecting workforce participation and community engagement [1,3].

External constraints: Impact on supply chains

Restricted access to international markets directly impedes procurement of critical supplies including intraoral scanners, specialized cements, and laboratory equipment spare parts [5]. This dynamic not only escalates costs through reliance on alternative suppliers with significant markups [5], but also disrupts research and development projects, accelerating technological obsolescence even in reference academic institutions [4,5]. Dependence on international donations and technical incapacity to repair damaged equipment further exacerbate this operational crisis [5].

Resilience strategies: Innovating from adversity

In response to these converging challenges, adaptive solutions leveraging local resources have emerged. Notable initiatives include: strategic implementation of clinically validated national biomaterials [4]; enhanced capacity of decentralized prosthetic workshops in community polyclinics to improve service accessibility [3]; systematic prioritization of functional removable techniques offering optimal cost-benefit ratios [3]; and creation of cooperative networks with Latin American universities and specialized NGOs to facilitate technical training and supply access [3]. These efforts reflect the ethical commitment of professionals reinventing their practice within restrictive contexts, though they urgently require expanded institutional support to scale their impact [2,3].

Discussion

The inherent tension between a solidarity-based healthcare model and material constraints imposed by external circumstances generates fundamental ethical dilemmas: How to allocate scarce resources without violating basic rights? Is offering only basic prosthetic options sustainable when technically superior alternatives exist globally? [3].

The challenges and resilience strategies in prosthetic rehabilitation within the Cuban system, developed to sustain equitable access to these essential services, are consistent with the broader realities of oral health care in the developing world [6]. Cuban science could pioneer transformative responses through three strategic pathways: advancing applied research in local biomaterials and low-cost techniques with international validation [4]; rigorously documenting the multidimensional psychosocial impact of untreated edentulism [1,3]; and forging innovative international alliances to overcome technological barriers via South-South cooperation frameworks [5]. It must be reaffirmed that dental prosthetics constitutes not a cosmetic luxury, but an essential component of the fundamental right to a functionally and socially dignified life. Based on the author's literature review and professional experience during training and practice, establishing a National Prosthetic Rehabilitation Program focused on priority populations like older adults would significantly elevate population health status.

Concurrently, fostering research implementing local biomaterials and low-cost techniques through competitive funding is crucial. Strategic alliances with Latin American dental schools and health NGOs for technology transfer remain vitally important. Systematically documenting and raising awareness in international forums about global barriers affecting Cuba's oral health is imperative. Finally, implementing sustained training programs for professionals in efficient management of limited resources is essential.

Conclusion

Cuba maintains a healthcare system with commendable universal principles, yet dental prosthetic rehabilitation remains inaccessible for substantial population segments. Scientific creativity and professional commitment constitute invaluable assets in this context, but require concrete enabling conditions: targeted public policies with transparent budgetary allocation; strategic investment in context-appropriate technologies; and geopolitically unrestricted international cooperation.

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