

PRODUCTION MANAGEMENT IN THE CONTEXT OF DENTISTRY: A SYSTEMATIC LITERATURE REVIEW (PART 1)

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RESUMO

O estudo busca resumir e analisar o que é conhecido em relação a práticas de gestão da produção no contexto de assistência odontológica. Foi conduzida uma revisão da literatura na base de dados Web of Science® com o corte temporal de 2008 a 2018. Os achados foram separados por ano de publicação e periódico. 21 artigos foram encontrados. Os resultados parciais mostram os anos com maior número de publicações, bem como os periódicos que mais publicaram sobre o tema e em quais países os estudos foram produzidos. Estar ciente de como vão as pesquisas no contexto aqui abordado possibilita entender o estado atual da arte e pode direcionar o futuro das próximas pesquisas.

PALAVRAS-CHAVE: Gestão em Saúde. Clínica Odontológica. Escritório Odontológico. Administração da Prática Odontológica. Saúde Bucal.

ABSTRACT

This study aims to sum up and analyze what is known regarding the practice of production management in the context of oral healthcare assistance. A literature review was conducted in the Web of Science™ database with a periodical constraint from 2008 to 2018. The findings were separated according to the year of publication and journal. Twenty-one articles were found. The partial findings show the years with the largest number of publications, as well as the journals that most have published on the theme and in which countries the studies have been produced. To be aware of how the researches in such a context have been makes possible to understand the current state of the art and may orientate the future of next researches.

Keywords: Health Management. Dental Clinic. Dental Office. Dental Practice Management. Oral Health.

1. INTRODUÇÃO

Oral health is considered a prerequisite for people's wellbeing (BRASIL, 2004; PRASAD; VARATHARAJAN, 2011). The Brazilian health system offers oral healthcare by different ways, ranging from *Sistema Único de Saúde* (SUS) to private clinics (CFO, 2005; CROSP, 2018; SÃO PAULO, 1999), but they are not enough to meet all people's demand yet (MATOS *et al.*, 2002).

The *Pesquisa Nacional de Amostra de Domicílios*' (PNAD) data show that the dental clinic most visited by patients is the private clinic (IBGE, 2000; IBGE, 2010). These ones, in turn, have financial reasons to exist (for profit), which means they need financial feedback to keep working.

A dental clinic, like any other organization, needs managerial support to work and provide services (NERY-DA-SILVA, 2018; SAM; BONNICK, 2011; SLACK; BRANDON-JONES; JOHNSTON, 2015). There are many studies using technology to help dental activities, such as the use of 3D printers (BURDE; CONSTANTINIUC; CÂMPIAN, 2015) or computational aid (KIM; LEE, 2015; SAM; BONNICK, 2011). Economic and financial analyses for managing dental clinics have also been increased over the years (HETTIARACHCHI *et al.*, 2018; O'CONNELL; GRIFFIN, 2011; TONMUKAYAKUL *et al.*, 2015). Other management ways have been applied likewise, such as process analysis (AHMED; AMAGOH, 2014) and mapping (NERY-DA-SILVA, 2018).

Despite the importance of these studies, strategic techniques, as well as the concern with productivity and business continuity are not properly clarified with respect to their current status. Which are the resources offered to, and practiced in, dental clinics for them to keep working? Which is the current status of researches on business and/or strategic management in dental clinics, especially private clinics?

2. METHOD

This study repeats Hofmann and Bosshard's (2017) research method by conducting a systematic literature review to gather what has been produced regarding the application of production management techniques in the context of dental service provision.

The literature research was conducted from June to August 2018 in the Web of Science™ database. The periodical constraint was from 2008 to August 2018.

2.1 Formulation of the research questions

The following research questions (RQ) were elaborated:

- RQ1. What is the current status of the existing literature on Production Management in Dental Service Provision?
- RQ2. What are possible areas for future research on Production Management in Dental Service Provision?

2.2 Inclusion and exclusion criteria

According to Slack, Brandon-Jones, and Johnston (2015), production management seeks to manage resources that create and deliver products and services. As such, it was defined as inclusion criterion that the studies must have the main of assuring or supporting the

accomplishment of dental practice, i.e. it must be of managerial nature and/or intend to support decision-making by providing some information. Studies related to dental prosthesis will be included only if the dental prosthesis laboratory were identified as being inside the dental clinic or dental office, according to the *Conselho Federal de Odontologia* (CFO, 2005) and *Conselho Regional de Odontologia de São Paulo* (CROSP, 2018). Similar to Hettiarachchi *et al.*'s (2018) study, inclusion was limited to articles written in English, Portuguese and Spanish and to human studies. In vitro and laboratory-based studies, letters, editorials, guidelines, conference proceedings, case reports, methodology papers, and literature reviews were excluded.

The keywords used in the research (Table 1) also find many articles that only belong to the specific dentistry field, such as restoration techniques or analysis of the structure of dental materials, i.e. researches that can only be performed by dental practitioners and related areas. Therefore, it is defined as exclusion criterion studies of exclusive dental practitioner nature.

Table 1 - Keywords used in the literature research

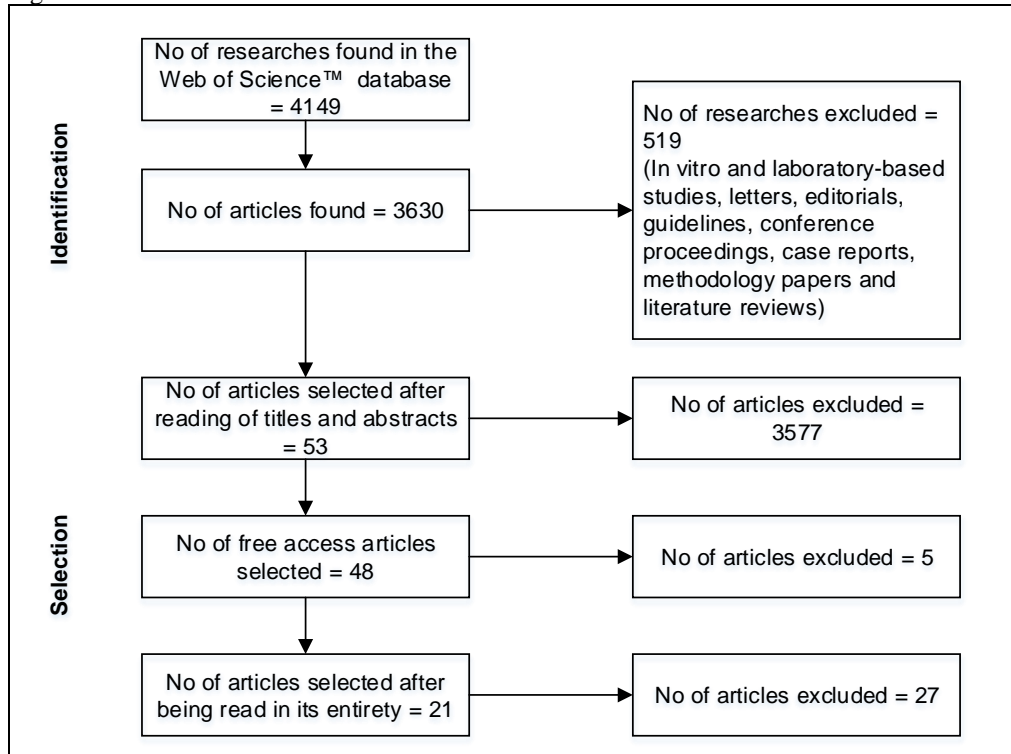
Production Management	Relationship	Dentistry
Production	Analysis	Dental
Productivity	Application	Dental Care
Production Management	Capacity	Dental Clinic
	Effectiveness	Dental Hospital
	Efficiency	Dental Office
	Loss	Dental Service
	Measurement	Dental Service Hospital
	Use	Dentistry
	Using	Health Service
	Utilization	Oral Health

2.3 Literature research process

The *Descritores de Ciências da Saúde* (DeCS, 2018) was consulted to select the keywords to be used in the literature research. The descriptors used by Hettiarachchi *et al.* (2018) were also considered because of the similarity with the research purpose. Table 1 shows the keywords used in the literature research.

Altogether, 300 keywords combinations were used. 4,149 articles were found in the Web of Science™ database. Fifty-three articles were selected for further reading. Five of them are restricted access and were then excluded from the literature review process, which resulted in forty-eight articles to be analyzed. After being read in their entirety, twenty-one articles were selected (43.75%). Of these, five are still under discussion to be included in the literature review. For this reason, we will not show the articles and their respective authors here, because a final step is still necessary for finishing the election process. We will show every article selected in the final version of this paper. Figure 1 shows the research process and the selection of articles until now.

Figure 1 - Process of articles selection



Source: elaborated by the authors based on Grupo PRISMA (2015).

2.4 Next steps

The next step will be the creation of criteria for systematic analysis, which will be made based mainly on Hofmann and Bosshard's (2017) study, but also on Hettiarachchi *et al.*'s (2018) and Friday *et al.*'s (2018) studies. Next, the results will be analyzed, described, and discussed in order to provide a conclusion on the theme, which we believe will be done by July 2019.

3. CONCEPTUAL INTEGRATION OF PRODUCTION MANAGEMENT AND DENTAL SERVICE PROVISION

We intend to establish a conceptual integration of production management and dental service provision and thus to structure for the studies a classification model with respect to the level of application of production management in the context of dentistry. Such a conceptual integration will start from the conceptualization of production management (section 3.1) and a description of how dental service provision occurs and how its characteristics are (section 3.2). Once such a conceptual integration is done, we hope it will be possible to measure the degree (extent) of production management application existing in dental clinics.

3.1 Production management

Production management is the activity of managing resources that create and deliver service and products (SLACK; BRANDON-JONES; JOHNSTON, 2015). In this present research, production management means the ways (systems, resources, methods, techniques) which the dental clinic's manager relies on to assign continuity to the business, as well as to reach productive aims such as efficiency, capacity, utilization, services expansions, among others.

Depending on the degree of maturity of an organization, its level of management and strategic techniques will fluctuate from the simplest ones to the most complex ones, ranging from a singular activity or sector to the whole company and even outside it, including its whole supply chain (BALLOU, 2006; PIRES, 2014).

3.2 Dental Service Provision

Dental service provision, as well as other production or service segments, also needs a physical place, i.e. an installation prepared and structured for the activity to occur (SLACK; BRANDON-JONES; JOHNSTON, 2015). Such places are predominantly hospitals, ambulatories, clinics, and offices (CFO, 2005; IBGE, 2000; IBGE, 2010; SÃO PAULO, 1999).

Slack, Brandon-Jones, and Johnston (2015) clarify the various existing forms of production function. They also clarify the possible name variations to define the one who is responsible for the operation of an organization. In the case of dental clinics, *administrative manager* is understood as the most applicable name.

In Brazil, provision of dental assistance occurs through different ways, such as SUS (BRASIL, 1988a; BRASIL, 2004; MATOS *et al.*, 2002), which is a result of the public initiative provided for the law (BRASIL, 1988b), or of private initiatives. The latter ones are carried out through private dental clinics, which are legal entities with profit motives (BRASIL, 1998a; PRASAD; VARATHARAJAN, 2011; SORIA; BORDIN; COSTA FILHO, 2002). In addition, there are also the clinics associated with syndicates (AGÊNCIA NACIONAL DE SAÚDE SUPLEMENTAR, 2006; PIETROBON *et al.*, 2008) and university dental clinics (ELGEZAWI *et al.*, 2017; MARTINS *et al.*, 2016; ZILLI *et al.*, 2017).

All these kinds of clinics are options for people to look for oral healthcare assistance. In this sense, such clinics suffer competition between one another, which means they need to dedicate to ensure that their services will be looked, and more than that, to ensure that their services will be accomplished with efficiency and effectiveness (NERY-DA-SILVA, 2018).

4. PARTIAL FINDINGS AND COMMENTS

To demonstrate partial findings, the 21 articles selected until now were considered. With the findings got until now it is already possible to make some observation related to the number of publications and the publication trends (both journals and countries).

Figure 2 shows the number of articles found separated per year, considering the periodical constraint applied. Note that the year 2013 is the one with the largest number of publications (19% of the total). On the other hand, no study was published on the theme in 2009.

Figure 2 - No of articles found in the database from 2008 to August 2018

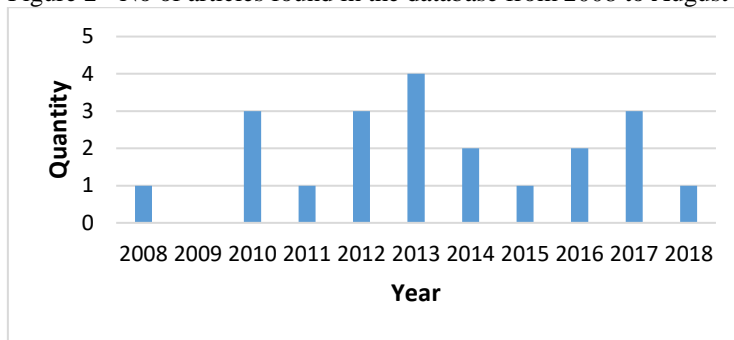


Figure 3 – Countries where the study has been produced

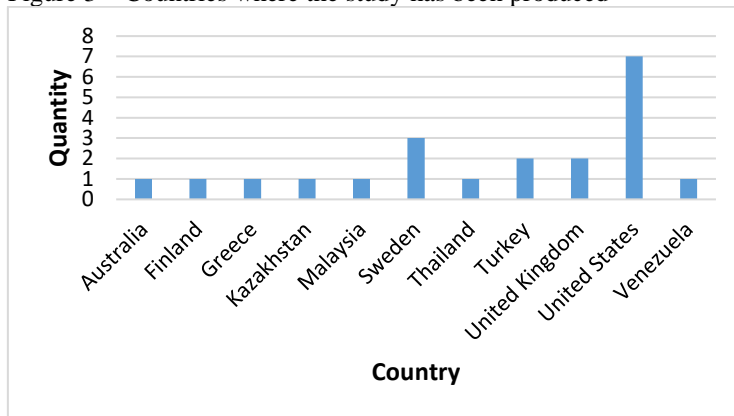


Figure 3 shows the countries where the studies have been produced. The countries that most have produced such studies were The United States (33%) and Sweden (14%). Table 2 shows the source of the articles selected in the literature research. Note that the journal Ergonomics, Journal of Dental Education, BMC Oral Health and Journal of Public Health are the ones with the largest number of publications on the theme (47.62% of the total).

Table 2 - Source of the articles selected

Source	No. of articles
<i>BMC Oral Health</i>	2
<i>Community Dentistry Oral Epidemiology</i>	1
<i>Community Dental Health</i>	1
<i>Competitiveness Review</i>	1
<i>Environmental Monitoring and Assessment</i>	1
<i>Ergonomics</i>	3
<i>International Conference on Service Systems and Service Management</i>	1
<i>Journal of Dental Education</i>	3
<i>Journal of Industrial Engineering and Management - JIEM</i>	1
<i>Journal of Public Health Dentistry</i>	2
<i>Military Medicine</i>	1
<i>Pediatric Dentistry</i>	1
<i>Revista de Ciencias Sociales</i>	1
<i>Social Science & Medicine</i>	1
<i>UKSim-AMSS 18th International Conference on Computer Modelling and Simulation</i>	1

As far as we can tell, this study is the first literature review on production management in the context of dentistry. At first, we can see that a few numbers of articles have been published on the theme. However, it is not possible yet to measure the degree of maturity of such articles, nor their relevance levels.

It is worth stressing that these findings are partials and still in progress, therefore many conclusions, trends, and relevant issues can still be gotten. For example, we hope to answer RQ2 with future findings.

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REFERÊNCIAS

AGÊNCIA NACIONAL DE SAÚDE SUPLEMENTAR. Agência Nacional de Saúde Suplementar. **Resolução Normativa (RN) nº 137**, 2006. Acesso em: 2018 março 03.

AHMED, S.; AMAGOH, F. Process analysis and capacity utilization in a dental clinic in Kazakhstan. **Competitiveness Review**, v. 24, n. 4, p. 347-356, 2014.

BALLOU, R. H. **Gerenciamento da cadeia de suprimentos/logística empresarial**. 5. ed. Porto Alegre: Bookman, 2006.

BRASIL. Lei nº 9656 (Lei Ordinária), de 03 de junho de 1998. Dispõe sobre os Planos e Seguros Privados de Assistência à Saúde. **Diário Oficial da União**, Brasília, p. 1, 03 junho 1998a.

BRASIL. Constituição da República Federativa do Brasil - 1988. **Diário Oficial da União**, Brasília, v. 191, p. 1, 05 outubro 1988b.

BRASIL. **Diretrizes da política nacional de saúde bucal**. Brasília: Ministério da Saúde, 2004.

BURDE, A.-V.; CONSTANTINIUC, M.; CÂMPIAN, R.-S. Applications of RepRap three-dimensional printers in dentistry - a literature review. **International Journal of Medical Dentistry**, v. 5, n. 1, p. 37-43, 2015.

CFO. Consolidação das Nomas para Procedimentos nos Conselhos de Odontologia, aprovada pela Resolução CFO-63/2005, atualizada em 18 de maio de 2005. **Diário Oficial da União**, v. 19, p. 104, 2005.

CROSP. **Conselho Regional de Odontologia de São Paulo**, 2018. Disponível em: <<http://www.crosp.org.br>>. Acesso em: 08 junho 2018.

DECS. **Descritores em Ciências da Saúde (DeCS)**, 2018. Disponível em: <<http://decs.bvs.br/cgi-bin/wxis1660.exe/decserver/>>. Acesso em: 01 junho 2018.

ELGEZAWI, M. et al. Complexity of comprehensive care treatments in undergraduate dental programs: The benefits of observing and assisting experienced faculty members. **Saudi Dental Journal**, v. 29, p. 161-166, 2017.

FRIDAY, D. et al. Collaborative risk management: a systematic literature review. **International Journal of Physical Distribution & Logistics Management**, v. 48, n. 3, p. 231-253, 2018.

GRUPO PRISMA. Principais itens para relatar Revisões sistemáticas e Meta-análises: A recomendação PRISMA. **Epidemiol. Serv. Saúde**, Brasília, v. 24, n. 2, p. 335-342, jun. 2015.

HETTIARACHCHI, R. M. et al. The cost-effectiveness of oral health interventions: A systematic review of cost-utility analyses. **Community Dent Oral Epidemiol**, v. 46, n. 2, p. 118-124, 2018.

HOFMANN, E.; BOSSHARD, J. Supply chain management and activity-based costing: current status and directions for the future. **International Journal of Physical Distribution & Logistics Management**, v. 47, n. 8, p. 712-735, 2017.

IBGE. **Acesso e utilização de serviços de saúde. PNAD 1998**. Rio de Janeiro: IBGE, 2000.

IBGE. **Acesso e utilização de serviços de saúde. PNAD 2008**. Rio de Janeiro: IBGE, 2010.

KIM, J. H.; LEE, J. A semantic network analysis of technological innovation in dentistry: a case of CAD/CAM. **Asian Journal of Technology Innovation**, v. 23, n. sup1, p. 40-57, mar. 2015.

MARTINS, R. G. et al. "Programa saúde e cidadania": a contribuição da extensão universitária na Amazônia para a formação médica. **Revista de Medicina**, v. 95, n. 1, p. 6-11, 2016.

MATOS, D. L. et al. Projeto Bambuí: avaliação de serviços odontológicos privados, públicos e de sindicato. **Rev Saúde Pública**, v. 36, n. 2, p. 237-243, 2002.

NERY-DA-SILVA, G. **Mapeamento de processos em uma clínica odontológica**. 2018. 128 f. Dissertação (Mestrado profissional em Ciência e Tecnologia em Saúde) - Universidade de Mogi das Cruzes - UMC, Mogi das Cruzes, 2018.

O'CONNELL, J. M.; GRIFFIN, S. Overview of methods in economic analyses of behavioral interventions to promote oral health. **J Public Health Dent**, v. 71, n. Suppl., p. 101-118, 2011.

PIETROBON, L. et al. Planos de assistência à saúde: interfaces entre o público e o privado no setor odontológico. **Cien Saúde Colet**, v. 13, n. 5, p. 1589-1599, 2008.

PIRES, S. R. I. **Gestão da cadeia de suprimentos: conceitos, estratégias, práticas e casos - Supply management**. 2. ed. São Paulo: Atlas, 2014.

PRASAD, B. M.; VARATHARAJAN, D. Using dental care resources optimally: quality efficiency trade-offs in a competitive private market. **International Journal of Health Care Quality Assurance**, v. 24, n. 4, p. 284-299, 2011.

SAM, F. E.; BONNICK, A. M. Office computer systems for the dental office. **Dental Clinics of North America**, v. 55, n. 3, p. 549-557, 2011.

SÃO PAULO. Aprova a Norma Técnica que estabelece condições para instalação e funcionamento de estabelecimentos de assistência odontológica, e dá providências correlatas. **Diário Oficial da União**, São Paulo, v. 109, n. 3, p. 21, 20 janeiro 1999.

SLACK, N.; BRANDON-JONES, A.; JOHNSTON, R. **Administração da produção**. 4. ed. São Paulo: Atlas, 2015.

SORIA, M. L.; BORDIN, R.; COSTA FILHO, L. C. Remuneração dos serviços de saúde bucal: formas e impactos na assistência. **Cad Saúde Pública**, v. 18, n. 6, p. 1551-1559, 2002.

TONMUKAYAKUL, U. et al. Systematic Review and Quality Appraisal of Economic Evaluation Publications in Dentistry. **Journal of Dental Research**, v. 94, n. 10, p. 1348-1354, 2015.

ZILLI, M. G. et al. Contribuições de uma clínica escola no atendimento em saúde no sul de Santa Catarina. **Revista Interdisciplinar de Estudos em Saúde**, v. 6, n. 1, p. 105-116, 2017.

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