



# Providing Effective Dental Care for an Ageing Population

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## ABSTRACT

**Background:** Effective treatment produces improved outcomes from the patient and clinician perspectives. The focus of this article is effective dental care for ageing patients. This concept must be embraced through research, education and, finally, clinical care.

**Research:** Older adults often carry a higher burden of health and socioeconomic issues that limit their participation in clinical trials. This leaves providers to extrapolate care decisions from research in other age groups. However, electronic health records allow researchers to converge extensive medical, pharmacologic, and dental data, thereby including older patients in research questions.

**Education:** Dental and medical educators are tasked with teaching skills specific to ageing patients. This requires teaching and active use of concepts such as whole health and patient-centred outcomes.

**Provision of care:** For ageing patients, effective care is precision care (the right care to the right patient at the right time). Clinicians must be trained and then actively participate in the interdisciplinary approach to assure good oral health for all older patients.

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## Introduction

Effective care can be defined as care that achieves good outcomes, helps a patient maintain quality of life, and is based on the best evidence available.<sup>1</sup> More specifically, an efficacious treatment is one that is available, targeted, and appropriately recommended and adhered to.<sup>2</sup> In some disciplines, the words efficacy and effectiveness are synonymous, but health care has chosen to define these 2 words very differently, especially in terms of research. In health research, efficacy could be thought of as explanatory, or determining whether an intervention works, often under ideal conditions. Effectiveness, on the other hand, has been thought of as pragmatic, or beneficial in a “real-world” vs experimental setting.<sup>3</sup> For this article, we will discuss effective care and effectiveness research, as this concept speaks very powerfully to concepts that are critically important in geriatric care. Effective dental treatment in a broader sense includes quality of life, health literacy, and patient choice, all of which move to a

more holistic positive outcome and improved oral health for the world’s ageing population.

The concept of effective care should not be thought of only in a clinical setting but as part of a continuum. As noted in the [Figure](#), effectiveness research, effective oral health education, and effective clinical care must all be in place to provide the intended outcome of improved oral health for an ageing population. Each of these 3 areas within the dental profession inform and drive the other 2 to continuously improve the care we provide to ageing patients.

The aims of this article are to briefly describe these 3 aspects of effective treatment and how they can move the dental profession towards improved oral health for our ageing population, as well as to provide some strategies that might improve each of these three areas.

## Effectiveness research

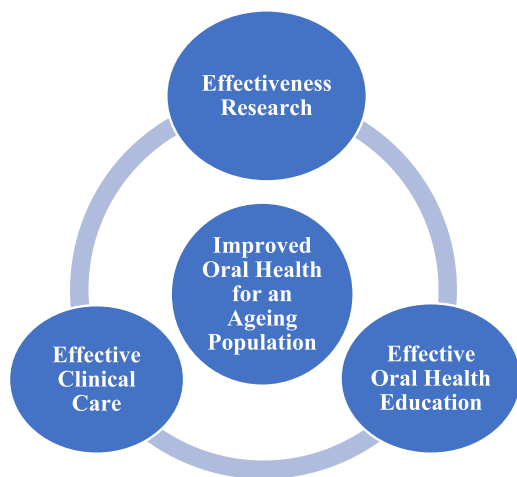
Effectiveness research has been called “pragmatic” research and must be beneficial in the real world. This is in contrast to efficacy research, which evaluates a treatment’s ability to produce a desired result. Efficacy research often has very specific inclusion criteria, which can exclude patients with significant comorbidities. Historically, efficacy studies, even when well designed, are narrow randomised controlled trials (RCTs) and have left out many ageing patients, as they have

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**Figure – Continuum for improved oral health for an ageing population.**

the greatest number of systemic and dental comorbidities of any age group. Stated another way, ageing patients often carry a higher burden of exclusion variables. In 2016, the 21st Century Cure Act required the National Institutes of Health to update their policy to promote the inclusion of all ages,<sup>4</sup> including older adults, although this is still difficult if patients are excluded due to the inclusion and exclusion criteria in an RCT. Effectiveness research, which is accomplished using previously collected electronic health record (EHR) data, is one way to include ageing patients in research. These large data sets allow for analysis of relevant outcomes, such as need for future treatment, and importantly allow for numbers large enough to also assess the effect of numerous comorbidities on the outcome. They also allow for comparisons to patient satisfaction surveys and quality-of-life measures to obtain a more complete picture of outcomes. Patients and providers must also have access to information regarding the potential harm of treatments. In RCTs that are narrower in scope, negative outcomes may be rare. With larger effectiveness studies, there is opportunity to not only identify rare events but look at comorbidities that might be strongly associated with both the treatment and the negative outcome.

Given that large numbers of ageing adults are often excluded from efficacy studies, providers are left to extrapolate clinical decisions from such studies in younger cohorts. One good example of this is the use of varying types of topical fluorides to prevent and arrest caries in adults. There are currently only 2 efficacy studies regarding the use of silver diamine fluoride to arrest caries in adults.<sup>5,6</sup> This contrasts with the significantly greater number of studies evaluating caries arrest in primary and sometimes permanent teeth in children.<sup>7-9</sup> The 2 adult studies evaluated only root or dental caries. We are therefore left to extrapolate the benefits of silver diamine fluoride in adults for caries arrest on coronal surfaces, and most would agree that the oral environment of a 75-year-old mouth can be quite different from a 7-year-old oral cavity. As further evidence, the American Dental

Association's (ADA) Topical Fluoride for Caries Prevention recommendations list the strength of evidence for adult root caries prevention at the level of "expert opinion," given the need to extrapolate the evidence from studies provided in children.<sup>10</sup>

Although comprehensive administrative and electronic health record data can be a cost-effective method to conduct clinical effectiveness studies in the geriatric population, this is not without its associated challenges. A major barrier is the lack of standardization for collection of comparable variables, lack of use of diagnostic codes to document the reason for the treatment rendered, and inability to link dental and medical EHRs. Some entities that provide dental care like Health Partners and the Department of Veterans Affairs (VA) have made inroads in this domain by including diagnosis data. VA Dentistry mandated the use of *International Classification of Disease Codes* (ICD) 9/10 diagnostic codes early in the inception of their electronic dental record (EDR). To facilitate data entry and to document the reason why a particular treatment was rendered, providers have access to a "quick pick" list with the most used codes. However, it has been noted that the ICD-10 codes may not be sufficiently specific and lack coverage of all dental and oral diagnoses.<sup>11</sup> Another diagnostic framework that can be utilized is SNODENT (Systemized Nomenclature of Dentistry) which provides standardized terms for describing dental disease<sup>11</sup>; however, it has been criticized for quality issues<sup>12</sup> and many of the diagnostic terms are provided without adequate definitions.<sup>13</sup> Further, a consortium of dental schools, the Consortium for Oral Health-Related Informatics (COHRI), has had the goal of developing and implementing a standardized dental diagnostic vocabulary rather than relying on free text or unstructured formats as is common in dental schools.<sup>14</sup> Finally, key to the consolidation of large data sets from varying EHRs is the need for a data standardization process, which allows the conversion of data from disparate sources into a comparable format.

Despite the challenge of the lack of diagnostic data in the EDR, a review of the literature has found that reusing electronic data for research in dentistry is in its early stages but is rapidly increasing.<sup>15</sup> A data-mapping study determined that "a non-trivial number of data elements in general dental records can be mapped either completely or partially to data fields in research studies" conducted by dental practice-based research network studies.<sup>16</sup> More recently, the feasibility of using EDR from multiple practices to conduct longitudinal studies and assess treatment outcomes has been demonstrated in National Dental Practice-Based Research Network practices<sup>17</sup> as well as within VA Dentistry.<sup>18</sup>

As EDR designs continue to evolve and improve, consistent data domains should be included across all systems that can capture data for subsequent use in research as well as quality improvement initiatives. Simple measures, such as the single item self-report of oral health<sup>19</sup> can be valuable markers for the oral health status of an individual as well as a population of patients and can be used to track changes over time.

## Oral health education in dental, medical, and allied health schools

To provide effective care for patients of all ages, dental education is tasked with teaching skills that are specific to the population served, and this includes ageing patients. Predoctoral standards by the Commission on Dental Accreditation (CODA) in the US have competencies that include older and compromised ageing patients as part of generalised populations but are not specific to the geriatric population. In 2017, Ettinger et al evaluated undergraduate geriatric dental education and found that whilst all US dental schools had a didactic component, only 57% had a clinical component specific to geriatric patients.<sup>20</sup> It is important that all dental trainees be exposed to the medical, social, and environmental issues that will inform dental treatment planning and provision of care for ageing adults.

To evaluate inclusion of geriatric dental education in post-doctoral dental training, Mueldener et al looked at the inclusion of geriatric care in advanced general dentistry training within the US.<sup>21</sup> They found that 22% of the programs who responded had a geriatric didactic component and 29% had a geriatric core competency.<sup>21</sup> Advanced or specialty training in either geriatric dental care or special care dentistry has been established in countries throughout the world, including Australia, New Zealand, Brazil, Japan, and the United Kingdom. However, the United States has not currently recognized either of these disciplines as a dental specialty. Currently, an advanced education residency dedicated to geriatric dentistry is under consideration by CODA. There is a great need in the US to create pathways for both educators and researchers in the area of geriatric dentistry, and creating recognized advanced education programmes is the first step.

One way to address geriatric dentistry in curriculum is the use of evidence-based care. This concept as defined by the ADA is very similar to the Agency for Healthcare Research and Quality's definition of translational effectiveness and incorporates the judicious integration of the best evidence base in the clinical intervention, accounting for patients' oral and medical conditions and history as well as the dentist's expertise and patient's treatments needs and preferences.<sup>22</sup> This concept accounts for many of the issues faced by ageing patients and incorporates patient-centred care as well as looking at quality-of-life issues by including patient preferences in treatment decisions.

Dentistry has historically bent towards a surgical model vs a medical model of care. More than 10 years ago, Garcia et al called for a concerted paradigm shift from a surgical to medical model of care in dentistry, incorporating the many preventive advancements made in dentistry.<sup>23</sup> Geriatric dentistry is an ideal discipline to incorporate the evidence-based concept into teaching. Utilising a less invasive approach (eg, silver diamine fluoride, selective caries removal, in-office fluoride) benefits frail patients and has good scientific evidence that should be taught and utilized. However, this medical model of practice forces providers out of their surgical mindset, and this is truly where practice and education must meet. Continuing education for current clinicians is another necessary venue for advancing evidence-based care for ageing patients.

A great model for geriatric care is interprofessional education which can be built into the undergraduate dental curriculum.<sup>24-26</sup> Many initiatives have been created internationally to encourage interprofessional and geriatric oral health education.<sup>26-29</sup> Further, there is increasing recognition internationally of the importance of integrating oral health into medical care, including mention in reports by the World Health Organization and the National Institutes of Health.<sup>27,30-33</sup> The importance is so great that the World Dental Federation lists medical–dental integration as the first of its 8 core pillars for healthy ageing.<sup>34</sup> The U.S. Department of Health and Human Services has developed a series of resources to encourage new or enhanced oral health programmes for seniors (<https://oralhealth.acl.gov/>).<sup>35</sup> Several training programmes and curricula exist for medical professionals to learn how to include oral health in their routine assessments.<sup>36-40</sup> Further, several validated tools exist to guide medical providers through an oral health assessment.<sup>41-43</sup>

## Effective clinical care

If we return to the definition of effective care as care that is available, targeted, and appropriately recommended and adhered to,<sup>2</sup> this definition encompasses many of the issues we must address with our ageing patients. Concepts not routinely used in clinical dentistry such as whole health and quality of life must be embraced to truly provide effective dental care for ageing patients. Whole health is a movement from “find it and fix it” to considering the full range of physical, emotional, mental, social, spiritual, and environmental issues that would affect a patient's life, and dentistry most certainly has a place in this larger scope of efficacious outcomes. Integrated medical and dental records are not only key for dental research but also greatly enhance a provider's ability to holistically treat a patient; however, to date, this integration is rarely found. Oral health can be both a benchmark for and a determinant of quality of life. If we are to acknowledge quality of life as a measurement of effective care, we also need to measure this in order to improve our quality of care. Whilst there are several instruments that have been validated in research to measure both quality of life and oral health quality of life, they lack validation for use in clinical quality applications.<sup>44</sup>

Whilst guidelines, policies, and recommendations for successful integration of medicine and dentistry are most common, there are effective clinical care models from which we can draw knowledge.<sup>45</sup> Certain large health care delivery systems in the US have robust and innovative collaborations, including the US Department of Veterans Affairs, Programs of All-Inclusive Care for the Elderly (PACE), Kaiser Permanente, Health Partners, Apple Tree Dental, and some Federally Qualified Health Centers.<sup>36,46</sup>

There are models for effective care that incorporate the concepts of assessment of frailty, dependency, and the correct care at the correct stage in our lives. One example is the Seattle Care Pathway, developed in 2013 by an international group of dental providers.<sup>47</sup> This is an evidence-based approach that can be adopted globally and approaches dental care assessment, prevention, treatment, and communication

based on the patients' needs at varying levels of dependency.<sup>47</sup> Finally, an article by Chen et al describes oral health trajectories or stages at the end of life.<sup>48</sup> The authors describe the 3 stages; decline, preactive dying, and active dying, along with the expected oral health problems and suggests treatment goals that are truly aimed at providing the patient with the best possible oral health quality of life for each stage. These examples demonstrate how effective dental care must encompass the whole patient approach to be successful.

## Conclusions

To reach the goal of improved oral health for our ageing population, this article lays out an argument that effectiveness research, effective education and effective treatment must be part of the equation. To achieve these, there is a call to action regarding several issues. Robust electronic health records are needed for every stage of this process, and these must be linked to the patient's medical data as well to be useful in both research and clinical care. Dentistry needs a common diagnostic or coding system to allow research to link treatment to diagnoses to fully embrace evidence-based care, and clinicians must be willing to provide these diagnoses as a routine part of their documentation. A new cadre of dentists and hygienists must be trained to treat frail and medically compromised ageing patients, so that both training and research in this area will flourish. To do this, the profession must embrace geriatric dentistry as a recognised discipline. Finally, all dental providers should utilise evidence-based care concepts for ageing patients, including a whole health approach for these patients' dental care, and providers must be comfortable as part of the interdisciplinary care team.

## Author contributions

G. Gibson: article conception, literature review, article drafting, and revising. C.J. Wehler: article conception, literature review, article drafting, and revising. M.M. Jurasic: article conception, literature review, article drafting, and revising.

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## REFERENCES

1. What does an "inadequate" practice look like? Focus on "effective" care. Practice Business. 2018. Available from: <https://practicebusiness.co.uk/what-does-an-inadequate-practice-look-like-focus-on-effective-care>. Accessed 20 April 2022.
2. El-Serag HB, Talwalkar J, Kim WR. Efficacy, effectiveness, and comparative effectiveness in liver disease. *Hepatology* 2010;52:403–7. doi: 10.1002/hep.23819.
3. Gartlehner G, Hansen RA, Nissman D, Lohr KN, Carey TS. Criteria for distinguishing effectiveness from efficacy trials in systemic reviews. AHRQ; 2006 Publication No. 06-0046 April.
4. Vaughan CP, Dale W, Allore HG, et al. AGS report on engagement related to the NIH inclusion across the lifespan policy. *J Am Geriatr Soc* 2019;67(2):211–7. doi: 10.1111/jgs.15784.
5. Li R, Lo ECM, Lui BY, Wong MCM, Chu CH. Randomized clinical trial on arresting root caries through silver diamine fluoride applications in community-dwelling elders. *J Dentistry* 2016;51:15–20. doi: 10.1016/j.jdent.2016.05.005.
6. Zhang W, McGrath C, Lo ECM, Li JY. Silver diamine fluoride and education to prevent and arrest root caries among community-dwelling elders. *Caries Research* 2013;47:284–90. doi: 10.1159/000346620.
7. Contreras V, Toro MJ, Elias-Boneta AR, Encarnacion-Burgos A. Effectiveness of silver diamine fluoride in caries prevention and arrest: a systematic review. *Gen Dent* 2017;65(3):22–9.
8. Trieu A, Mohamed A, Lynch E. Silver diamine fluoride versus sodium fluoride for arresting dentine caries in children: a systematic review and meta-analysis. *Scientific Report* 2019;9:2115–24. doi: 10.1038/s41598-019-38569-9.
9. Schmoedel J, Gorseta K, Splieth CH, Juric H. How to intervene in the caries process: early childhood caries- a systematic review. *Caries Res* 2020;54:102–12. doi: 10.1159/000504335.
10. Weyant RJ, Tracy SL, Anselmo T, et al. Topical fluoride for caries prevention: executive summary of the updated clinical recommendations and supporting systematic review. *J Am Dental Assoc* 2013;144(11):1279–91. doi: 10.14219/jada.archive.2013.0057.
11. American Dental Association Technical Report No 1092. Implementation guide to utilization of diagnostic code(s)/term(s) in dental records. 2021.
12. Goldberg LJ, Ceusters W, Wisner J, et al. The significance of SNODENT. 2005. Available from: <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.86.5818>. Accessed 25 February 2022.
13. ADA SNODENT Concept. Available from: <https://snodent.ada.org/?component=251332005&term=caries>. Accessed 25 February 2022.
14. White JM, Kalenderian E, Stark PC, Ramoni RL, Vaderhobli R, Walji MF. Evaluating a dental diagnostic terminology in an electronic health record. *J Dent Educ* 2011;75(5):605–15 May.
15. Song M, Liu K, Abromitis R, Schleyer T. Reusing electronic patient data for dental clinical research: a review of current status. *J Dent* 2013;41:1148–63. doi: 10.1016/j.jdent.2013.04.006.
16. Liu K, Acharya A, Alai S, Schleyer T. Using electronic dental record data for research: a data-mapping study. *J Dent Res* 2013;92(Suppl 7):S90–6. doi: 10.1177/0022034513487560.
17. Thyvalikakath TP, Duncan WD, Siddiqui Z, et al. National Dental PBRN Collaborative Group. Leveraging electronic dental record data for clinical research in the National Dental PBRN Practices. *Appl Clin Inform* 2020;11:305–14. doi: 10.1055/s-0040-1709506.
18. Jurasic MM, Gibson G, Orner MO, Wehler CJ, Jones JA, Cabral H. Topical fluoride effectiveness in high caries risk adults.

- J Dent Res 2022 Epub ahead of print. doi: [10.1177/00220345221081524](https://doi.org/10.1177/00220345221081524).
19. Jones JA, Kressin NR, Miller DR, Orner MB, Garcia RI, Spiro III A. Comparison of patient-based oral health outcome measures. *Qual Life Res* 2004;13(5):975–85. doi: [10.1023/b:qure.0000025596.05281.d6](https://doi.org/10.1023/b:qure.0000025596.05281.d6).
  20. Ettinger RL, Goettsche ZS, Qian F. Predoctoral teaching of geriatric dentistry in US dental schools. *J Dent Educ* 2017;81(8):921–8. doi: [10.21815/jde.017.043](https://doi.org/10.21815/jde.017.043).
  21. Mueldener EJ, McQuistan MR, Qian F, Hartshorn JE, Oishi MM. An evaluation of the geriatric dental curricula within Advanced Education in General Dentistry and General Practice Residency programs in the United States. *Spec Care Dentist* 2021;41:210–7. doi: [10.1111/scd.12553](https://doi.org/10.1111/scd.12553).
  22. Chiappelli F. Evidence-based dentistry: two decades and beyond. *J Evid Base Dent Pract* 2019;19(1):7–16. doi: [10.1016/j.jebdp.2018.05.001](https://doi.org/10.1016/j.jebdp.2018.05.001).
  23. Garcia RI, Sohn W. The paradigm shift to prevention and its relationship to dental education. *J Dent Educ* 2012;76(1):36–45.
  24. Kossioni A, Vanobbergen J, Newton J, Muller F, Heath R. European College of Gerodontology: undergraduate curriculum guidelines in gerodontology. *Gerodontology* 2009;26(3):165–71. doi: [10.1111/j.1741-2358.2009.00296.x](https://doi.org/10.1111/j.1741-2358.2009.00296.x).
  25. Dolan TA. Professional education to meet the oral health needs of older adults and persons with disabilities. *Spec Care Dentist* 2013;33(4):190–7. doi: [10.1111/scd.12013](https://doi.org/10.1111/scd.12013).
  26. Marchini L, Ettinger R, Chen X, et al. Geriatric dentistry education and context in a selection of countries in 5 continents. *Spec Care Dentist* 2018;38(3):123–32. doi: [10.1111/scd.12281](https://doi.org/10.1111/scd.12281).
  27. Oral health in America: advances and challenges. 2021. Available from: <https://www.nidcr.nih.gov/oralhealthinamerica>. Accessed 22 March 2022.
  28. Joskow RW. Integrating oral health and primary care: federal initiatives to drive systems of change. *Dent Clin N Am* 2016;60(4):951–68. doi: [10.1016/j.cden.2016.05.010](https://doi.org/10.1016/j.cden.2016.05.010).
  29. Kossioni AE, Marchini L, Childs C. Dental participation in geriatric interprofessional education courses: a systematic review. *Eur J Dent Educ* 2018;22(3):e530–41. doi: [10.1111/eje.12348](https://doi.org/10.1111/eje.12348).
  30. Mara M. Interdisciplinary education and health care in geriatric dental medicine. *Dent Clin N Am* 2021;65:377–91. doi: [10.1016/j.cden.2020.11.001](https://doi.org/10.1016/j.cden.2020.11.001).
  31. Geriatrics Interdisciplinary Advisory Group. Interdisciplinary care for older adults with complex needs: American Geriatrics Society position statement. *JAGS* 2006;54:849–52. doi: [10.1111/j.1532-5415.2006.00707.x](https://doi.org/10.1111/j.1532-5415.2006.00707.x).
  32. Peterson PE. World Health Organization global policy for improvement of oral health—World Health Assembly 2007. *Int Dent J* 2008;58:115–21. doi: [10.1111/j.1875-595x.2008.tb00185.x](https://doi.org/10.1111/j.1875-595x.2008.tb00185.x).
  33. Petersen PE. Strengthening of oral health systems: oral health through primary health care. *Med Princ Pract* 2014;23(Suppl 1):3–9. doi: [10.1159/000356937](https://doi.org/10.1159/000356937).
  34. FDI World Dental Federation. Oral health for an ageing population: roadmap for healthy ageing. Available from: <https://www.fdiworlddental.org/roadmap-healthy-ageing>. Accessed 20 April 2022.
  35. Administration for Community Living. Oral health overview. Available from: <https://acl.gov/programs/health-wellness/oral-health>. Accessed 25 April 2022.
  36. Ghezzi EM, Niessen LC, Jones JA. Innovations in geriatric oral health care. *Dent Clin N Am* 2021;65:393–407. doi: [10.1016/j.cden.2020.12.002](https://doi.org/10.1016/j.cden.2020.12.002).
  37. The Gerontological Society of America. Interprofessional solutions for improving oral health in older adults. 2017. Available from: <https://www.geron.org/images/gsa/documents/gsa2017oralhealthwhitepaper.pdf>. Accessed 16 March 2022.
  38. Smiles for Life: A national oral health curriculum. 2022. Available from: <https://www.smilesforlifeoralhealth.org/>. Accessed 20 April 2022.
  39. Dolce MC, Holloman JL, Goodkind AB. Faculty readiness for oral health integration into health care professional education: a pilot study. *J Allied Health* 2016;45(3):199–206.
  40. Kossioni AE, Hajto-Bryk J, Janssens B, et al. Practical guidelines for physicians in promoting oral health in frail older adults. *J Am Med Dir Assoc* 2018;19(12):1039–46. doi: [10.1016/j.jamda.2018.10.007](https://doi.org/10.1016/j.jamda.2018.10.007).
  41. Dickinson H, Watkins C, Leathley M. The development of the THROAT: the holistic and reliable oral health assessment. *Clin Eff Nurs* 2001;5:104–10.
  42. Kayser-Jones J, Bird WF, Paul SM, Long L, Schell ES. An instrument to assess the oral health status of nursing home residents. *Gerontologist* 1995;35(6):814–24. doi: [10.1093/geront/35.6.814](https://doi.org/10.1093/geront/35.6.814).
  43. Chalmers JM, King PL, Spencer AJ, Wright FA, Carter KD. The oral health assessment tool – validity and reliability. *Aus Dent J* 2005;50(3):191–9. doi: [10.1111/j.1834-7819.2005.tb00360.x](https://doi.org/10.1111/j.1834-7819.2005.tb00360.x).
  44. American Dental Association Quality Alliance. Environmental scan of patient reported oral healthcare measurement. Final Report. 2020. Available from: [https://www.ada.org/-/media/project/ada-organization/ada/ada-org/files/resources/research/dqa/dental-quality-measures/measure-development/2020\\_prm\\_environmentalscan.pdf?rev=9f453e4737764c158bc60b5c8a4365b6&hash=BAA87A03F2F56FA7AFDF25CC8A78D326](https://www.ada.org/-/media/project/ada-organization/ada/ada-org/files/resources/research/dqa/dental-quality-measures/measure-development/2020_prm_environmentalscan.pdf?rev=9f453e4737764c158bc60b5c8a4365b6&hash=BAA87A03F2F56FA7AFDF25CC8A78D326). Accessed 6 March 2022.
  45. Harnagea H, Lamothe L, Couturier Y, et al. From theoretical concepts to policies and applied programmes: the landscape of integration of oral health in primary care. *BMC Oral Health* 2018;18(1):23–35. doi: [10.1186/s12903-018-0484-8](https://doi.org/10.1186/s12903-018-0484-8).
  46. Jones JA, Snyder JJ, Gesko DS, Helgeson MJ. Integrated medical-dental delivery systems: models in a changing environment and their implications for dental education. *J Dent Educ* 2017;81(Suppl 9):eS21–9. doi: [10.21815/jde.017.029](https://doi.org/10.21815/jde.017.029).
  47. Pretty IA, Ellwood RP, Lo ECM, et al. The Seattle Care Pathway for securing oral health in older patients. *Gerodontology* 2014;31(Suppl 1):77–87. doi: [10.1111/ger.12098](https://doi.org/10.1111/ger.12098).
  48. Chen X, Kistler CE. Oral health care for older adults with serious illness: when and how? *J Am Geriatr Soc* 2015;63:375–8. doi: [10.1111/jgs.13240](https://doi.org/10.1111/jgs.13240).