SYSTEMATIC REVIEW

Exploring the inclusion of dental providers on interprofessional healthcare teams treating patients with chronic obstructive pulmonary disease: a rapid review

[version 1; peer review: 1 approved]

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Abstract

Chronic obstructive pulmonary disease (COPD) is the third leading cause of death in the world. Emerging concepts like One Health, integrated care models for COPD, and associations between oral and respiratory health are innovative ways to approach COPD treatment. This study explored contemporary evidence on the inclusion of dental providers on interprofessional healthcare teams treating patients with COPD. The first objective was to explore the current state of interprofessional care for COPD, and the second objective was to explore dentistry used in interprofessional care. A rapid review was conducted from January–June 2020 using Scopus and PubMed. Upon assessing for duplication and relevance, 85 articles were included for Objective 1, and 194 for Objective 2. The literature suggests that when dental providers are included on interprofessional healthcare teams, treatment outcomes for patients with multi-morbid, chronic disease such as COPD, are improved. The papers collected for review suggest that educational and clinical programs should implement interprofessional collaboration when treating chronic diseases. Healthcare teams can utilize the expertise of professionals outside the traditional medical field to better understand patients' needs. Healthcare administration should consider a One Health approach when developing COPD treatment guidelines. We believe our results are transferable to the Canadian healthcare system. The collaborative nature and holistic philosophy of a One Health approach provides a novel way to develop policies and procedures that can effectively address the burden of COPD.

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Any reports and responses or comments on the article can be found at the end of the article.

Keywords

Chronic Obstructive Pulmonary Disease, COPD, dental providers, interprofessional care, One Health

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Introduction

Chronic obstructive pulmonary disease (COPD) is a complex disease characterized by persistent adverse respiratory symptoms and airflow limitation due to airway and alveolar abnormalities¹. COPD is often attributed to smoking, occupational exposures to particulate matter, and pre-existing asthma among other risk factors¹. The possibility of acquiring comorbidities, such as cardiovascular disease, osteoporosis, and psychological distress, is very likely for patients with COPD². COPD is currently the third leading cause of death in the world¹. When analysing global health-related quality of life measures, patients with COPD often experience poorer physical, social, and psychological health attributed to increased emergency department visits and hospitalisations^{2,3}. Given the complexity of COPD, patients often face challenges with accessing and receiving coordinated care, resulting in a fragmented healthcare experience⁴. Interprofessional team-based care for COPD exists, and is often quite successful; however, not all patients have access and there are many barriers to their implementation⁴. We believe, along with others in the scientific literature, that a larger focus on interprofessional team-based care is essential to improve the overall quality of care and quality of life for patients with COPD¹⁻⁴.

Background

Patients with COPD are often at risk of developing multi-organ complications; therefore, COPD has been classified as a systemic disease². While a variety of healthcare professionals (respiratory therapists, family physicians, nurses, pulmonary technicians, etc.) are involved in caring for patients with COPD, dental providers are often overlooked⁵. Despite this gap in practise, the relationship between oral health and COPD has been explored in scientific, clinical, and educational domains, pointing to a vital need for integrating dental care into COPD treatment⁵.

Studies have shown that the microbiome in both the lung and oral cavity is similar and connected through a bi-directional relationship^{5,6}; a pathogen exchange between the lung and oral cavities occurs through saliva aspiration and hematogenous spread⁶. Infected teeth or gums act as a reservoir for anaerobic bacteria that provoke respiratory symptoms like wheezing, and the same bacteria can also be isolated in infected lungs^{5,6}. The most common dental condition associated with COPD is periodontitis: a chronic inflammatory disease of the periodontal tissue, or gums, caused by bacterial infection⁵⁻⁷. If a patient has COPD or periodontitis, it is highly likely that the severity of disease progression for both conditions is exacerbated by the other⁶. Training dental students to better understand chronic medical disease processes (such as those pertaining to COPD) will better prepare them for working with other healthcare professionals in clinical team settings; therefore, improving quality of care for chronic disease patients⁸.

Patients with COPD are often shown to have poorer oral health compared to healthy control patients, evidenced by limited dental visits and lack of dental hygiene habits (in particular, not flossing enough)⁵. Clinical practise guidelines advise dental providers on specific accommodations for their

COPD patients during appointments, including: performing procedures with the dental chair upright, being cautious when irrigating and suctioning, having emergency oxygen supply nearby, conducting routine periodontal treatments, and providing education on proper oral and denture hygiene⁷. From a clinical perspective, healthcare teams should incorporate the expertise of dental providers when managing patients with COPD in order to acknowledge the oral-systemic health link and treat accordingly⁹.

Interprofessional education (IPE) between medical, dental, and nursing students is becoming increasingly common both in professional degree programs and in on-site work training¹⁰. IPE prepares students to apply what they learned in the classroom to clinical care settings with other health professionals¹¹. One study showed that the success of IPE programs depend on institutional infrastructures, inclusivity between programs, student workload, and faculty time and buy-in¹¹. Studies surveying the attitudes of dental hygiene and dental students towards IPE have found that students believe it is useful because they can see the real-world benefit of applying themselves as collaborative practitioners¹².

As a multifaceted, prevalent disease, COPD cannot be treated with conventional reductionist principles of medicine, but rather, with models emphasising collaboration between different health professionals¹³. Recognized as one of the ten goals for future Canadian medical education, interprofessional treatment approaches are essential for enhancing patient-centred care¹⁴. Interprofessional collaboration involves regular meetings between different health and social care professions to discuss how to solve complex care problems, like those involved in COPD, by integrating expertise from their respective fields¹⁵. This is different from interprofessional teamwork whereby those involved in treatment planning do not share a common identity¹⁵. Multidisciplinary teamwork occurs when members from disciplines outside of traditional healthcare (such as economics and the social sciences) work alongside each other in a parallel rather than an integrated fashion to solve complex cases¹⁵. Finally, transdisciplinary teamwork is defined when members in one professional group undertake the roles and responsibilities of another profession; although outside their usual scope, it is assumed that these members are competent enough to complete the presenting tasks¹⁵.

One Health is an emerging approach that extends beyond the ideas found in interprofessional care by stressing the connections between humans, animals, and their shared environment, as well as the need for transdisciplinary communication, or communication between experts in different fields inside and outside of medicine¹⁶. One Health is currently being endorsed by prominent organizations like the Centers for Disease Control and Prevention and the World Health Organization as a systems framework that considers the patient as part of a larger system with levels ranging from cellular to societal¹⁷. The etiology of several infectious diseases trace back to how humans interact with animal reservoirs and their surrounding environmental conditions; therefore, a One Health approach has proven to be very applicable to infectious disease¹⁶. One Health experts are also

highlighting the benefits of applying this approach to prevalent non-infectious diseases like COPD¹⁶. Studying animal models or analysing environmental sources of COPD like biomass fuel burning in resource-poor countries presents new areas of research to better understand the pathophysiology of COPD¹. Therefore, the patient-provider encounter can be enriched by One Health principles that encourage healthcare teams to include a variety of experts in medical, dental, and public health sectors to better understand their patients' needs and history¹⁷. For the purpose of this review, we are selectively using the inclusive collaboration aspect of a One Health approach to strengthen and support interprofessional rather than multi- or trans-disciplinary care for COPD.

The burden of COPD on healthcare systems and global health, the relationship between COPD and oral health, and interprofessional interventions for chronic diseases highlight that effective COPD treatment demands a diverse, collaborative One Health-focused approach. The aim of this study was to explore contemporary evidence on the inclusion of dental providers on interprofessional healthcare teams treating patients with COPD. The objective was to explore the current state of interprofessional care for COPD treatment, and dentistry used in interprofessional care settings through a One Health lens.

Methods

A rapid literature review was conducted from January through June 2020. Rapid reviews are a synthesis of the most current evidence in the literature by exercising elements of systematic reviews in a timely fashion to inform and support public health decision-making¹⁸. Papers describing interprofessional care approaches to treat COPD were categorised as Objective 1, and interprofessional care approaches incorporating dentistry were categorised as Objective 2. We gathered papers based on each objective by following a sequence of steps: literature search, appraisal, synthesis, and analysis¹⁸. Papers collected at each step were screened by all authors and reviewed by the senior author (SLS) to assess for bias and accuracy. The articles were analysed through a One Health approach, which focuses on the importance of comprehensive, holistic care.

Literature search

A literature search for each objective was conducted on PubMed and Scopus. Inclusion criteria included primary and secondary studies and practise guidelines published between January 2015–May 2020 in either Canada or the United States. Given the nature of a rapid review and the relatively novel topic of this paper, any range shorter than five years may not have produced many results. Papers were excluded if they did not mention any keywords in the title or abstract, were not written in English, were not accessible electronically, were not available in full text, were classified as grey literature, and were not final publications. Search query strings and collected articles were documented on a Microsoft Excel document and Mendeley citation management software. Duplicate papers were removed. For the remaining articles, titles and abstracts were assessed for eligibility by the lead author (NIN), which included whether the paper aligned with the aim of this study or not.

The literature search step is summarized in [Figure 1](#). Search query strings for Objectives 1 and 2 are shown in [Table 1](#). The last search was run on the databases on May 1st, 2020.

Appraisal

Appraisal checklists specific to each article type were used from the Critical Appraisal Skills Program (CASP) developed by Oxford Centre for Triple Value Healthcare¹⁹. Examples include checklists for systematic reviews, cohort studies, and qualitative studies¹⁹. We used the CASP checklists to assess the quality of study methods to determine if the findings of the eligible articles are trustworthy and meaningful (*Extended data*²⁰)¹⁸. Articles were examined in more detail during this step. As a result, 12 were removed for Objective 1 and 58 for Objective 2 because they did not align with inclusion or exclusion criteria, or the aim of this study. This step was completed by NIN, GJF, JR, and OMN.

Synthesis

Relevant data from the appraised papers for each objective were extracted based on the aim(s), population/setting(s), methods, results, limitations, relevance to the aim, and applicability to the Canadian healthcare context¹⁸. The co-authors established conclusions and recommendations for each objective by evaluating the commonalities and differences across the studies, weighting the results by their methodological quality, and assessing their relevance to a One Health approach¹⁸. See *Extended data* for more information²⁰.

Analysis

These conclusions were then analysed for feasibility within the Canadian healthcare context using McMaster University's Applicability and Transferability Tool²¹. The tool is designed to capture important issues related to proposed policy or program interventions within a given healthcare context²¹.

Results

The interprofessional care approach

Over 90% of papers for Objective 1 found that interprofessional healthcare teams are traditionally restricted to clinical practitioners, yet COPD exacerbations are experiences that, for most patients, extend beyond a physical biomedical episode¹³. Many patients with COPD struggle with social and psychological concerns related to loss of meaning, hope, and fear of death²². One study that investigated the correlation between anxiety and patient treatment interventions documented a 45% reduction in anxiety related to COPD diagnosis after completing a multidisciplinary pulmonary rehabilitation program²³.

For Objective 2, the majority of articles support the addition of oral health practitioners within primary care teams. This interprofessional approach shifts care from curative, reductionist healthcare principles to preventive, patient-centered principles^{24–28}. The literature suggests that dental providers should adopt a comprehensive approach that accounts for both the patient's biomedical needs, along with physical and social²⁹. Several articles suggest empowering patients to be contributing members of their treatment teams²⁹. One study showed that

when a patient's role on the care team is ignored, or information is not properly communicated, recovery is negatively affected, and the perception of fragmented care can lead to confusion and distrust from the patient³⁰. Effective communication is enhanced when a care team acknowledges the patient as a whole, including their cultural and linguistic preferences and socioeconomic status^{31,32}. Studies have found that medical and dental providers agree that basic preventive oral health services should be incorporated into medical visits to reduce the burden of dental disease carried by patients in at-risk, low socioeconomic areas^{33,34}.

Several authors have demonstrated a need to incorporate the social determinants of health into dental education, modeled by interprofessional healthcare teams with diverse knowledge beyond a biomedical approach^{33,34}.

Interprofessional care in clinical and educational settings

In addition to the significance of interprofessional healthcare teams for patients with COPD, other papers assessed the practicality of these teams in clinical and educational

Figure 1. Annotated PRISMA flow diagram visualizing the identification and filtration of papers as part of the 'Literature Search' step of the rapid review. (A) Objective 1; (B) Objective 2.

settings³⁵⁻⁴¹. After the implementation of a COPD interprofessional care program, one study reported the 30-day emergency department revisit rate declined from 49% to 30%. Another study reported a COPD 30-day readmission rate decrease from 22.7% to 14.7%^{35,42}. In contrast, a study by Bhatt *et al.* did not report a reduction in 30-day all-cause readmissions from a

comprehensive COPD multidisciplinary intervention⁴³. Mansoor *et al.* propose that interdisciplinary care is beneficial only with well-trained team members, well-established team norms, funded resources, and schedule flexibility³⁶. Another article demonstrated the challenge of miscommunication within healthcare systems, highlighting how a lack of coordination between

Table 1. Search query strings for Objectives 1 and 2 that were inputted into PubMed and Scopus.

Objective	Journal	Query String
1 (Interprofessional + COPD)	PubMed	(((((COPD OR chronic obstructive pulmonary disease OR "Pulmonary Disease, Chronic Obstructive"[Mesh])) AND (interdisciplinary OR multidisciplinary OR interprofessional OR inter-professional OR patient care team OR patient care teams OR health care team OR health care teams OR healthcare team OR healthcare teams OR team-based care OR team based care OR "Patient Care Team"[Mesh])) AND ((Clinical Trial[ptyp] OR Review[ptyp] OR Twin Study[ptyp] OR systematic[scb] OR Randomized Controlled Trial[ptyp] OR Practise Guideline[ptyp] OR Veterinary Observational Study[ptyp] OR Observational Study[ptyp] OR Meta-Analysis[ptyp] OR Journal Article[ptyp] OR Interview[ptyp] OR Guideline[ptyp] OR Comparative Study[ptyp] OR Clinical Trial, Veterinary[ptyp] OR Clinical Study[ptyp] OR Case Reports[ptyp]) AND (full text[scb] AND hasabstract[text]) AND "last 5 years"[pDat] AND (Humans[Mesh] OR Animals[Mesh:noexp]) AND English[lang])) AND (United States[PL] OR Canada[PL])
	Scopus	((TITLE-ABS-KEY(COPD OR "chronic obstructive pulmonary disease") AND TITLE-ABS-KEY(interdisciplinary OR multidisciplinary OR interprofessional OR "inter-professional" OR "patient care team" OR "health care teams" OR "health care team" OR "healthcare team" OR "healthcare teams" OR "team-based care" OR "team based care") AND (LIMIT-TO (SRCTYPE,"j")) AND (LIMIT-TO (PUBSTAGE,"final")) AND (LIMIT-TO (AFFILCOUNTRY,"United States") OR LIMIT-TO (AFFILCOUNTRY,"Canada")) AND (LIMIT-TO (DOCTYPE,"ar") OR LIMIT-TO (DOCTYPE,"re")) AND (LIMIT-TO (PUBYEAR,2020) OR LIMIT-TO (PUBYEAR,2019) OR LIMIT-TO (PUBYEAR,2018) OR LIMIT-TO (PUBYEAR,2017) OR LIMIT-TO (PUBYEAR,2016) OR LIMIT-TO (PUBYEAR,2015)) AND (LIMIT-TO (LANGUAGE,"English"))
2 (Dentistry + Interprofessional)	PubMed	(((((oral health practitioner OR oral health providers OR dental health provider OR dental health providers OR oral health provider OR oral health providers OR dentist OR dentists OR dental hygienist OR dental hygienists OR dental assistant OR dental assistants OR evidence based dentistry OR evidence-based dentistry OR "Evidence-Based Dentistry"[Mesh] OR "Dental Auxiliaries"[Mesh] OR "Dental Hygienists"[Mesh] OR "Dentists"[Mesh] OR "Dental Care for Chronically Ill"[Mesh])) AND (interdisciplinary OR multidisciplinary OR interprofessional OR inter-professional OR patient care team OR patient care teams OR health care team OR health care teams OR healthcare team OR healthcare teams OR team-based care OR team based care OR "Patient Care Team"[Mesh])) AND ((Case Reports[ptyp] OR Clinical Study[ptyp] OR Clinical Trial[ptyp] OR Clinical Trial, Veterinary[ptyp] OR Comparative Study[ptyp] OR Guideline[ptyp] OR Interview[ptyp] OR Journal Article[ptyp] OR Meta-Analysis[ptyp] OR Observational Study[ptyp] OR Veterinary Observational Study[ptyp] OR Practise Guideline[ptyp] OR Randomized Controlled Trial[ptyp] OR Review[ptyp] OR systematic[scb] OR Twin Study[ptyp]) AND (hasabstract[text] AND full text[scb]) AND "last 5 years"[pDat] AND (Humans[Mesh] OR Animals[Mesh:noexp]) AND English[lang])) AND (United States[PL] OR Canada[PL])
	Scopus	((TITLE-ABS-KEY("oral health practitioner" OR "oral health practitioners" OR "dental health provider" OR "dental health providers" OR "oral health provider" OR "oral health providers" OR "dental hygienist" OR "dental hygienists" OR "dental assistant" OR "dental assistants" OR "evidence based dentistry" OR "evidence-based dentistry") AND TITLE-ABS-KEY(interdisciplinary OR multidisciplinary OR interprofessional OR "inter-professional" OR "patient care team" OR "patient care teams" OR "health care team" OR "health care teams" OR "healthcare team" OR "healthcare teams" OR "team-based care" OR "team based care") AND (LIMIT-TO (PUBSTAGE,"final")) AND (LIMIT-TO (AFFILCOUNTRY,"United States") OR LIMIT-TO (AFFILCOUNTRY,"Canada")) AND (LIMIT-TO (PUBYEAR,2020) OR LIMIT-TO (PUBYEAR,2019) OR LIMIT-TO (PUBYEAR,2018) OR LIMIT-TO (PUBYEAR,2017) OR LIMIT-TO (PUBYEAR,2016) OR LIMIT-TO (PUBYEAR,2015)) AND (LIMIT-TO (DOCTYPE,"ar") OR LIMIT-TO (DOCTYPE,"re")) AND (LIMIT-TO (LANGUAGE,"English")) AND (LIMIT-TO (SRCTYPE,"j"))

veteran patients with COPD and community care providers resulted in delayed, missed, or inefficient care⁴⁴. A possible explanation, proposed by Ly *et al.*, is that healthcare professionals experience role changes as threats to their professional identity which may in turn cause resistance to collaboration⁴⁵. Role clarification can improve the efficacy of interprofessional teams and provide valuable insight on how to optimize quality improvement and the performance of these teams in clinical practice⁴⁵. A study that implemented an interprofessional population panel management curriculum targeted to diverse health profession trainees found trainees overwhelmingly reported an increased ability to identify patients who would benefit from interdisciplinary care or referral to another team member⁴⁶.

Many articles also stressed that collaboration between dental providers and other health professions within both clinical and educational domains is essential for improving health care outcomes for patients with complex medical and oral health needs, especially those with health inequities^{47,48}. Research assessing the current status of interprofessional collaboration states that in order to improve patient outcomes there needs to be changes made in the type of personnel providing health care services, with more non-dental professionals providing select dental services and dental providers providing select medical services⁴⁹. These changes require better integration of medical and dental education and patient care^{49,50}. It is expected that this long-term goal will improve health outcomes, increase patient satisfaction, better overall health of populations, and reduce per capita costs of healthcare^{49,50}. Primary healthcare teams in both rural and urban areas of Quebec have expressed their concerns on the absence of integrated oral health services for treatment purposes⁵¹. They suggest increased implementation of government policies, the prioritization of educational and management measures, and interprofessional collaboration toward innovative care models will facilitate the integration of these health services⁵¹.

There are challenges in incorporating IPE programs successfully at health professional schools largely due to the fact that the integration of these programs are still in their infancy^{48,52}. One IPE activity for health professional students supported progress toward interprofessional socialization, but student learning was inconsistently demonstrated in teamwork products⁵². Incorporating IPE may be particularly challenging for dental hygiene programs, as their curricula primarily emphasises employment in private practice where providers deliver care intraprofessionally (collaboration only between other dental providers)⁴⁸ and in relative isolation.

Interprofessional care, chronic disease, and multimorbidity

There is a high probability of being diagnosed with other comorbidities along with COPD^{53–57}. Given this, interprofessional healthcare teams must approach treatment plans with a

multi-morbidity (more than one comorbidity) outlook, which requires the inclusion of experts from several different specialties^{53–57}. One systematic review estimated that ≥ 1 chronic conditions (such as cardiovascular disease) coexist in $>85\%$ of patients with COPD⁵⁴. The authors stated that by utilizing an interprofessional approach, improvements could be made in the management of patients with COPD and other comorbidities⁵⁴. Such models have been associated with a 66% decrease in hospitalisations and a reduction in the number of exacerbations COPD patients experience⁵⁴. For COPD patients living with multimorbidities, the best care option is to change from disease-focused to patient-centred care, whereby providers look beyond the COPD diagnosis and instead see the patient as a whole to better understand the etiology of their comorbidities⁵⁵. Since comorbidities are often associated with a COPD diagnosis, healthcare teams should also shift to a more palliative-focused structure through partnerships with doctors, palliative experts (mainly nurses), and administrative executives to optimise quality of life and mitigate chronic suffering as much as possible⁵⁸.

Like COPD, oral diseases are also often associated with comorbidities^{34,50,59–63}. The inclusion of oral health into treatment plans has benefited patients across the lifespan who are living with chronic diseases^{34,50,59–63}. One case-control study concerning the inclusion of oral healthcare for patients with hemophilia makes a comparison with healthy individuals and reveals that hemophilic patients had higher debris and calculus scores, suggestive of poor oro-dental health status⁵⁹. The perception of childhood obesity as being a medical rather than dental issue, as well as dentists' unwillingness to suggest interventions due to the fear of being offensive and judgemental, has led to many missed opportunities for screening childhood obesity at the dental office⁵⁰. Patients with syndromic craniosynostosis also pose unique oral health conditions and dentofacial deformities that make it necessary to have oral healthcare providers as part of the interprofessional care team⁶¹. There is also a lack of knowledge surrounding sleep-disordered breathing among pediatric medical professionals; therefore, interprofessional care approaches are needed to benefit from the unique perspectives that dentists have on sleep-disordered breathing⁶². Including dentistry as part of interprofessional healthcare delivery directly addresses the comorbidities associated with dental diseases and can subsequently reduce hospital stays, advance patient well-being, and allow for fiscal savings⁶⁰.

Discussion

Based on the results of our review, we developed four key recommendations. Firstly, dental providers should be essential members on healthcare teams treating patients with COPD. The comorbidities associated with COPD are often other chronic diseases that have been treated and managed with dental expertise from dental providers; therefore, dental providers can offer valuable insight on some of the systemic conditions associated with COPD^{34,50,53–57,59–61,63}. Secondly, dental providers can offer a valuable perspective and skill set within any

interprofessional team. This is particularly important for educational and clinical purposes to enhance treatment outcomes for patients with COPD^{22,35–42,48,64–68}. Thirdly, it is imperative that healthcare leaders and decision-makers embrace interprofessional principles in the development of policies and guidelines to manage complex, chronic diseases like COPD⁶⁹. Lastly, our results align with the collaborative, multisectoral, and interprofessional aspect of the One Health approach which stresses that the patient is part of a larger system¹⁷. In order to fully embrace patient-centred care for patients with COPD, interprofessional teams are encouraged to follow One Health principles by extending beyond medicine, but into dentistry as well^{70,71}. Most importantly, the patient themselves, as well as their families and caregivers, should feel they are valuable members of their healthcare teams^{30,72}. By making interprofessional healthcare teams more holistic and inclusive of dental providers, they can better manage a patient's experience with COPD physically, mentally, and emotionally, and ultimately, provide quality comprehensive care^{11,22,23,37,64,73–78}.

Our recommendations were analysed using the Applicability and Transferability Tool to better understand their applicability to the Canadian healthcare context (Table 2). We surmise there are important lessons from our review that are transferable to the Canadian healthcare system. There remain many complexities and system-level barriers that will challenge their implementation. Despite provincial and territorial reforms to enable primary interprofessional healthcare teams to be functional, barriers still exist such as ineffective communication and role clarity, lack of functional dental and medical equipment under one health care setting, and inability to share dental and medical electronic health records^{34,45,79}. Changes at a system level are required to enable interprofessional teams to function to their full potential. One example would be to use redistributive policy, whereby transfers are made from one sector to another, to support more interprofessional care implementation⁸⁰. Focusing on evidence-based implementation will also support transitioning research into policy and clinical practise⁸¹. Sustainability of interprofessional care models must consider both patient and provider satisfaction⁸². As discussed by Bodenheimer and Sinsky, healthcare workers frequently report burnout and dissatisfaction, especially when new interventions (such as interprofessional care teams) are frequently implemented⁸². Overall, this review can support the foundation of reliable evidence-based policy to ensure that research investments maximise healthcare value and public health efforts⁸¹.

Limitations

Based on preliminary database searches conducted from September to December 2019, search queries were grouped together on the three main components of the study aim: 'dental providers,' 'interprofessional care,' and 'COPD.' This yielded one irrelevant result in PubMed and zero results in Scopus.

Arguably a methodological limitation, it also presents as a gap in the literature; therefore, driving the motivation and strength of this study. Finding adequate, eligible papers to analyse was possible under two objectives that grouped together the concept of interprofessional care with COPD and then dentistry, having interprofessional care as the common search term (visualised in Figure 2). This may seem like a limitation as the rapid review methodology does not directly address the three main components of the aim. However, by conducting a literature search on two objectives that commonly share the theme of interprofessional care, the inclusion of dental providers on interprofessional healthcare teams for COPD can be adequately justified and explored in the databases.

Studies harbouring significant results may have been eliminated during the Literature Search step based on the specificity of the search query strings for each objective or simply by gaps in the database algorithms. During the Appraisal step, papers classified as intervention evaluations or case reports did not have corresponding CASP checklists, resulting in possible inaccurate assessments of the study methods, further questioning the significance of the papers. In order to maintain the vigour and validity of the results, intervention evaluations were appraised with CASP economic evaluation checklists in accordance with the Workgroup for Intervention Development and Evaluation Research (WIDER) checklist⁸³. Case reports were evaluated with CASP case-control checklists and consultation from a publication in the Journal of Medical Case Reports⁸⁴. Non-specific literature reviews were also analysed with CASP systematic review checklists.

Conclusion

The landscape of COPD is complex and multilayered, making it an inherently difficult disease to manage; however, understanding COPD through the collaborative and multisectoral One Health approach is an innovative and promising solution because of its emphasis on collaborative and holistic principles⁷¹. Since this review explored an understudied topic in the literature, it is imperative that the results are used to guide current evidence-based healthcare decision-making. As stated by Mertz, author of the Dental-Medical Divide, "integrating oral health within broader health care systems promises to improve patient experiences and outcomes through better screening, referrals, and coordination of care, while decreasing overall costs (both dental and medical) through increased prevention and early treatment."⁸⁵ In order to alleviate the burden of chronic diseases like COPD, we must close the gap between medicine and dentistry which has historically been separated⁸⁵. This review serves as a starting point for an evidence-based, collective movement of interprofessional practitioners striving to increase awareness around the advantages of including dental providers on healthcare teams treating and improving the lives of patients with COPD.

Table 2. McMaster University Applicability and Transferability Tool. Information was gathered from the rapid review results and paper by Sibbald (2013)³⁵.

Construct	Factors	Questions	Answers
Applicability (Feasibility)	Political Acceptability or Leverage	<p>Will the intervention be allowed or supported in current political climate?</p> <p>Will there be public relations benefits for the local government?</p> <p>Will this program enhance the stature of the organization?</p> <p>Will the public and target groups accept and support the intervention in its current format?</p>	<ul style="list-style-type: none"> Supported in the current political climate Program will enhance stature of Canadian healthcare system Target groups like hospitals and the public are likely to support
	Social Acceptability	<p>Will the target population be interested in the Intervention?</p> <p>Is it ethical?</p>	<ul style="list-style-type: none"> COPD patients as the target population will accept the intervention (typically undemanding, unfamiliar with diagnosis). Therefore, open communication and attention will promote social acceptability Ethical to include other healthcare providers on healthcare teams as long as confidentiality and privacy regulations are in place
	Available Essential Resources (Personal and Financial)	<p>Who/what is available/essential for the local implementation?</p> <p>Are they adequately trained? If not, is training available and affordable?</p> <p>What is needed to tailor the intervention locally?</p> <p>What are the full costs (supplies, systems, space requirements for staff, training, technology/administrative supports) per unit of expected outcome?</p> <p>Are the incremental health benefits worth the costs of the intervention?</p>	<ul style="list-style-type: none"> Cost-effective, but requires funding or investment Require available healthcare providers willing to work on interprofessional healthcare teams for COPD Would require a place to practise, transmissible information for both patients and provider Training should not pose a problem as healthcare providers are expected to be fully licenced. Training is required for communication skills
	Organizational Expertise and Capacity	<p>Is the current strategic/operational plan in alignment with the intervention to be offered?</p> <p>Does this intervention fit with its mission and local priorities?</p> <p>Does it conform to existing legislation or regulations (either local or provincial)? Does it overlap with existing programs or is it symbiotic?</p> <p>Any organizational barriers/structural issues or approval processes to be addressed?</p> <p>Is the organization motivated (learning organization)?</p>	<ul style="list-style-type: none"> Provinces and territories have set out reforms to enable primary healthcare teams to be functional Overlap with existing programs implementing team-based care for chronic diseases Motivation stems from resident physicians or administrative powers to break the mold from siloed to synergistic healthcare Barriers: traditional physician-dominated hierarchies, role clarity, team function and structure, information overload, turnover of motivated residents Legislation is in place to support interventions, but requires a push towards action

Construct	Factors	Questions	Answers
Transferability (Generalizability)	Magnitude of the Health Issue in Local Setting	Does the need exist? What is the baseline prevalence of the health issue locally? What is the difference in prevalence of the health issue (risk status) between study and local settings?	<ul style="list-style-type: none"> The need exists (high prevalence of COPD in Canada and globally. One-in-four Canadians over 35 years of age will develop COPD)
	Magnitude of the 'Reach' and Cost-Effectiveness of the intervention Above	Will the intervention broadly "cover" the target population?	<ul style="list-style-type: none"> Project can begin in Ontario to start; but with hopes of national expansion into Canadian healthcare given the high national prevalence of COPD Implementing oral health providers on interprofessional care teams in hospitals can be accessible to most (given that Canadian healthcare is publicly funded) Canadian healthcare systems are currently unstable and not well-suited for effectively treating COPD, which is why it is anticipated that this intervention will take a long time to be implemented
	Target Population Characteristics	Are they comparable to the study population? Will any difference in characteristics (ethnicity, socio-demographic variables, number of persons affected) impact intervention effectiveness locally?	<ul style="list-style-type: none"> Of the papers collected and analysed in the 'Appraisal' step of the rapid review, a sizable portion of articles were conducted in the Canadian healthcare context or in countries with similar healthcare systems where the interventions were successful from a research/academic point of view

Figure 2. Overview of rapid review objectives. Visualizing how the objectives are a re-grouping of the three main components of the study aim.

Data availability

Underlying data

No data is associated with this article.

Extended data

Dryad: Exploring the inclusion of dental providers of inter-professional healthcare teams treating patients with chronic obstructive pulmonary disease: a rapid review, <https://doi.org/10.5061/dryad.31zcrjdjj>²⁰.

This project includes the following extended data:

- Appraisal Section of Rapid Review: Quality of the literature as assessed by CASP.
- Synthesis Section of Rapid Review: Characteristics of the literature for which data were extracted

Reporting guidelines

Dryad: PRISMA checklist for 'Exploring the inclusion of dental providers of interprofessional healthcare teams treating patients with chronic obstructive pulmonary disease: a rapid review', <https://doi.org/10.5061/dryad.31zcrjdjj>²⁰.

Data are available under the terms of the [Creative Commons Zero "No rights reserved" data waiver](#) (CC0 1.0 Public domain dedication).

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Maryam Tabrizi

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The article is well researched and timely for a chronic condition such as COPD, extremely relevant to the oral cavity's health condition. The topic is relevant and in line with Age-Friendly Health System and the 4Ms framework. An innovative health system allows oral health conditions to be recorded while taking the baseline health records in primary care and hospital settings. Further clinical studies are needed.

Are the rationale for, and objectives of, the Systematic Review clearly stated?

Yes

Are sufficient details of the methods and analysis provided to allow replication by others?

Yes

Is the statistical analysis and its interpretation appropriate?

Yes

Are the conclusions drawn adequately supported by the results presented in the review?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Geriatric oral health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 12 Apr 2021

Navia Novosel, Western University, London, Canada

Dear Dr. Tabrizi,

On behalf of the other authors and myself, we thank you for your insightful review and comments on our paper "Exploring the inclusion of dental providers on interprofessional healthcare teams treating patients with chronic obstructive pulmonary disease" for *F1000 Research*. Your expertise in geriatric oral health certainly makes your review extremely valuable and pertinent to our article. We would like to thank you again for your positive feedback.

Sincerely,
Navia I. Novosel

Competing Interests: No competing interests.

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