Healthcare Professionals' Perceptions of Pulmonary Rehabilitation as a Management Strategy for Patients with Chronic Obstructive Pulmonary Disease: A Critical Interpretive Synthesis

Emma Swift[a]., Mary R O'Brien[b], Sarah Peters[c]. and Carol Kelly[b]

[a] *Faculty of Education, Manchester Metropolitan University, Manchester, UK*, [b] *Faculty of Health, Social Care and Medicine, Edge Hill University, Ormskirk, UK,* [c] *Manchester Centre for Health Psychology, University of Manchester, UK.*

Corresponding Author:

Dr Emma Swift

Manchester Metropolitan University,

Brooks Building,

53 Bonsall Street,

Manchester,

M15 6GX

Telephone: 0161 2472034

Email: e.swift@mmu.ac.uk

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Abstract:

Purpose:

To establish literature regarding healthcare professionals' perceptions of pulmonary rehabilitation as a management strategy for patients with chronic obstructive pulmonary disease.

Method:

A critical interpretive synthesis was conducted; CINAHL, PsychINFO and MEDLINE were searched between 1988 and August 2019, using MeSH headings and key terms. Reference lists of accepted papers were also searched. Qualitative, quantitative and mixed methods studies, written in English, including healthcare professionals' perceptions of pulmonary rehabilitation were included. The search yielded 133 papers which were assessed for eligibility; 20 met the inclusion criteria.

Results:

Two themes were identified, the first explored 'Barriers to Pulmonary Rehabilitation' from a healthcare professional's perspective. This incorporated a lack of knowledge, a lack of resources, practical barriers, patient barriers, and healthcare professional's being unsure it is their role to refer. The second entitled 'General Perceptions of Pulmonary Rehabilitation', highlighted ways in which the programme could be

improved, the perceived positives and negatives, facilitators to referral, and perceptions of patients referred.

Conclusions:

This is the first systematic review to encompass the perceptions of healthcare professionals with ability to refer and those who deliver pulmonary rehabilitation. Referral was low, highlighting potential influencing factors such as a lack of programme knowledge, pulmonary rehabilitation beliefs, and communication skills. Given inclusion of studies from multiple geographical locations, the findings provide implications for any healthcare system that develops and delivers pulmonary rehabilitation. With respect of a lack of referrals to the programme, further research should highlight healthcare professionals' perceptions of the referral process, and the views of those in Secondary Care.

Key Words:

pulmonary rehabilitation; chronic obstructive pulmonary disease; healthcare professional; perception; referrals

Introduction:

Pulmonary rehabilitation is a non-pharmacological therapeutic management strategy used for people with chronic obstructive pulmonary disease (COPD) [1]. The programme is multidisciplinary, providing individualised patient care [2]. COPD is a degenerative chronic lung condition which presents with disabling symptoms, including cough, sputum production and dyspnoea [3]. The disease course is often punctuated by recurrent exacerbations, which can lead to acceleration of loss of lung function, functional ability and quality of life [3, 4]; this poses a significant burden in Europe with prevalence ranging from 5-10% of the population, increasing to 20% in those aged over 70 [5]. It is also an issue worldwide, with the Global Burden of Disease study highlighting that the prevalence of COPD was recorded at approximately 251 million cases worldwide during 2016 [6].

Pulmonary rehabilitation aims to improve the well-being of COPD patients, incorporating exercise, education, breathing techniques and psychological support [7]. This integrated approach provides personalised management, regardless of where individuals are on the disease trajectory [8]. Globally pulmonary rehabilitation is most frequently delivered via a series of classes in a hospital outpatient department lasting between 8-12 weeks, other forms are conducted whilst the individual is a hospital inpatient, in their own home, or within a primary care setting [9]. Many programmes have access to physiotherapists, nurses, dieticians and occupational therapists to deliver content, however availability of respiratory physicians, pharmacists, psychologists and social workers is limited [10]. Most commonly referral to the programme is made by a respiratory consultant or a general practitioner (GP), however some programmes allow patient self- referrals [9]. On

average more referrals are made to pulmonary rehabilitation from primary care than secondary care, however it is noted that those referred by a GP are less likely to complete the programme [11].

The evidence for effectiveness of pulmonary rehabilitation is robust, with a reduction in the likelihood of increased ventilatory impairment and skeletal muscle dysfunction for up to two years after participation [12]. In addition, patients who are referred to the programme for a second time often experience similar positive benefits [2]. Conducting pulmonary rehabilitation subsequent to COPD hospitalisation dramatically reduces the rate of re-admission and mortality [13, 14]; thus lessening the associated financial costs [15]. Although effective for improving health [12, 16], the availability and content of the programme differs greatly dependant on geographical location [17].

Healthcare professional engagement with referral is important to clinical practice [3], as pulmonary rehabilitation is recognised as one of the most cost effective management strategies for COPD [18]. The National COPD Audit Programme Pulmonary Rehabilitation Workstream provided details from 224 programmes in the United Kingdom (UK) [10, 19]. Although referral practice was not included in the audit, it noted that many people suitable for pulmonary rehabilitation are not referred. This was identified by assessing the number of people with COPD in the UK, compared to the number currently enrolled on the programme. The audit offered some possible explanations for low referral rates and attendance, suggesting that healthcare professionals may not be promoting pulmonary rehabilitation, and that

some practitioners may lack knowledge of its benefits. The reasons why are unclear and require further investigation.

Many individuals with COPD are unaware of the help available to them, and when asked about pulmonary rehabilitation do not remember being offered referral [20]. It is proposed that patient expectations of pulmonary rehabilitation are highly variable, and this is often dependant on whether the healthcare professional who referred them informed them of the benefits [21]. Patients are more likely to accept referrals to pulmonary rehabilitation from a healthcare professional they trust and who understands their condition [1], hence, it is important for those who refer to have an adequate level of knowledge regarding the programme [7]. This review therefore aims to establish healthcare professionals' perceptions of pulmonary rehabilitation.

Review Question:

What are healthcare professionals' perceptions of pulmonary rehabilitation as a management strategy for patients with COPD?

Methods:

Critical interpretive synthesis (CIS) was adopted for this review; a method developed by Dixon-Woods et al., [22] who took the formal structure of meta-ethnography, which only includes qualitative papers, and modified it to include a number of methodological approaches, including quantitative, qualitative and mixed methods. CIS supports the extraction of data, rather than whole studies, and enables integration of data from different research methodologies to produce a synthesising argument [23]. This allows for the creation of a narrative to display new understanding from the existing literature [24]. Due to the nature of the review question, studies previously conducted in the area have encompassed a range of

methodologies. It became apparent that a traditional systematic review, such as meta-analysis used to display evidence from only quantitative statistical research [25], or a meta-synthesis used to integrate and synthesise purely qualitative studies [26], would not be appropriate.

[Insert Table 1 here]

Search Strategy:

Three databases were selected: CINAHL, MEDLINE and PsychINFO. Searches were refined by restricting results from 1988 to August 2019; the approximate period that pulmonary rehabilitation has been advocated in COPD management [27]. A hand search was conducted in key respiratory journals, and in reference lists of accepted papers. Consultation with a clinical information specialist with expertise in creating advanced searches for systematic reviews, and an information specialist from Cochrane Airways confirmed the search terms and filters.

Key Concepts Defined:

The key concepts used to search all databases were “chronic obstructive pulmonary disease”, “pulmonary rehabilitation”, “healthcare professional” and “perception”. Where available, thesaurus or MeSH terms were used (e.g. attitude of health personnel), and these were exploded to encompass a wide range of other terms. Variants of search terms were used for example, perception*: belief*, view*, opinion*, attitude*, satisf*.

Phrases were grouped together with the use of quotation marks; truncation was also used to encompass different spellings or word endings. Each word variant was

linked with the Boolean Operator “OR”, and key concepts with “AND”. Proximity searching was implemented, which enabled words to be searched in relation to how close they were to one another. Terms were searched for in the title and abstract, with the search strategy adhered to in each database.

Data Extraction and Quality Appraisal:

Data extraction is particularly important in critical interpretive synthesis, as it requires appropriate data to be extracted in relation to the research question [22]. A data extraction form and quality appraisal was completed for each study meeting the inclusion criteria.

Quality appraisal followed guidance provided by Hawker et al., [28], as used in other published critical interpretive synthesis and systematic reviews, incorporating both qualitative and quantitative studies [29-31]. The tool was designed to appraise literature from various methodologies, therefore all questions were inclusive of qualitative, quantitative and mixed methods [28]. The protocol for scoring and appraising the literature was adapted by adding a question to assess relevance to the review question. Although quality appraisal is important when conducting critical interpretive synthesis, the focus should be on including papers of relevance to the research question, therefore, unless the paper is methodologically unsound, it should be included [22]. Thus, papers were appraised for quality by ES and CK and details were incorporated into the findings section of the review [32]. It should however be noted that no study was found to be of very poor quality. There were 10 screening questions with scores between one (poor) and four (good). The lowest quality score was 23 for a study by Yawn and Wollan [33] and the highest was 37 for research conducted by Harris, Hayter and Allender [34].

Data Synthesis:

A synthesising argument is formed within a critical interpretive synthesis when the data set has been reviewed in detail, and is used to give a representative overview of the information, providing a narrative to display new understanding gained from the review [30]. This is structured using synthetic constructs which take form after interpreting the literature as a whole, displaying it in a representative, yet new conceptual form [24, 35]. Each study that met the inclusion criteria (n=20) was included in the analysis to enhance the synthesis [30]. The method undertaken followed the main components of critical interpretive synthesis (figure 1).

[Insert Figure 1 here]

Two key themes were formed: Barriers to Pulmonary Rehabilitation and General Perceptions of Pulmonary Rehabilitation. The data was analysed by hand, initially annotating hard copies of included papers, and then transferring thoughts on to flip chart paper using post-it-notes. Transferring supporting quotes or extracts on to post-it-notes allowed for manoeuvrability between different synthetic constructs during the decision making process.

Results:

The review process was carried out in two stages following guidance from the Centre for Reviews and Dissemination (CRD) [36]. Initially 133 records were identified; removal of duplicates resulted in 109 papers. Each paper was screened by reading the title and abstract against the inclusion criteria, resulting in 63 papers. Stage two involved reviewing the full text of any remaining papers using the study selection form. The initial screening process was conducted by the primary researcher (ES),

and at stage two the remaining 63 were independently reviewed by CK; agreement was 100%.

Twenty papers met the inclusion criteria (see figure 2). The reason for exclusion (n=43) was either they did not include healthcare professionals' perceptions of pulmonary rehabilitation (n=36), or it was a discussion or review paper (n=7). The 20 studies included in the review encompassed a range of qualitative (n=11) and quantitative (n=6) methodologies, along with mixed methods (n=2), and action research (n=1). As no papers, in their entirety directly answered the review question, relevant data was extracted to form the synthesis.

[Insert Figure 2 here]

Demographic information of the synthesised research:

All included papers provided data related to healthcare professionals' perceptions of pulmonary rehabilitation; some had the ability to refer: GPs, practice nurses, nurse practitioners, community matrons, pulmonologists and respiratory physicians; others were physiotherapists who delivered pulmonary rehabilitation. The papers were published between 2005 and 2019 and included various methodological designs (see table 2). The studies also originated from a number of geographical locations: Australia (n=6), United Kingdom (UK): (n=4), United States of America (USA) (n=2), Canada (n= 2), Denmark (n=1), Japan (n=1), Portugal (n=1), Saudi Arabia (n=1), Taiwan (n=1),The Netherlands (n=1).

[Insert Table 2 here]

Presentation of the data:

Two overarching themes were established: 'Barriers to pulmonary rehabilitation' and 'General perceptions of pulmonary rehabilitation', with data displayed within synthesising arguments and synthetic constructs in the form of a narrative; further details of corresponding papers are provided in table 3 and 4.

[Insert table 3 here]

[Insert table 4 here]

Theme One Barriers to Pulmonary Rehabilitation:

Theme one comprises of five synthesising arguments: lack of knowledge, lack of resources, practical barriers, patient barriers, and unsure it is their role.

Lack of Knowledge:

Lacked understanding: It became apparent that many healthcare professionals lacked knowledge and were unsure of what pulmonary rehabilitation involved [34, 38, 41, 44, 45, 46, 47, 48]. This lack of confidence was consistent amongst practice nurses and GPs; "if we know what happens [in pulmonary rehabilitation] then we can sell it better" ([34], p. 284). Practice nurses appeared to have greater understanding of content and patient suitability for the programme [41]. It was unclear if these findings represent the views of those in secondary care.

Some healthcare professionals were unaware of the existence of pulmonary rehabilitation, or the evidence base [38, 47]. Only four healthcare professionals from a sample of N=123 in Saudi Arabia, had heard of pulmonary rehabilitation [38]. This uncertainty was reiterated by GPs in Australia: "One would assume that your local

major public hospital would do it [pulmonary rehabilitation] … my guess is that there probably are some private providers doing it but blowed if I know who they were" ([47], p.321).

Lack of patient knowledge: In contrast to a lack of healthcare professionals understanding, there was brief mention to a lack of patient knowledge [34, 40, 44, 53]. It was perceived a challenge to convince patients of the benefits, due to low-level awareness and knowledge surrounding COPD and pulmonary rehabilitation [34, 40]. Those who delivered the programme highlighted some patients arrive knowing nothing about pulmonary rehabilitation [53]. Some referrers used subjective judgement, and perceived that patients do not have the understanding, or health literacy to carry out self-management [44]. Others believed that patients are unaware of pulmonary rehabilitation, as they do not ask about it during appointments [34].

Lack of Resources:

Time: Although healthcare professionals perceived that some patients are incapable of self-management, they stated that they do not have the time or resources to teach patients these skills [44]. Practice nurses and GPs felt a standard consultation was insufficient to discuss attendance at pulmonary rehabilitation, and that "if you get round to talking about pulmonary rehab you're doing very well … there doesn't seem to be a role for it in a typical general practice model" ([34], p.285). This emphasised other aspects may be prioritised, and highlighted a negativity towards the programme. Similarly, others perceived it would take an hour and a half to assess patient eligibility, and this competed with other duties [48]. Volume of work was also emphasised [34, 40, 45, 50], with the paperwork and tests required to make a referral considered excessive [40, 48].

Uncertainty of how to approach discussion of pulmonary rehabilitation: Some practice nurses found it difficult to discuss referral and perceived if they were in good health themselves, recommending exercise to people with COPD may appear patronising [34]. Others worried about asking patients to exercise [48]. This fear and uncertainty lead to discussion of pulmonary rehabilitation being overlooked, resulting in patients potentially not receiving the most appropriate management strategy. GPs described it as a "hurdle" to get patients to "co-operate and comply" with the idea of pulmonary rehabilitation and exercise ([47], p. 321), and these beliefs may be translated when proposing attendance at pulmonary rehabilitation, "it's not us knowing what has to be done, it's translating that into an outcome" ([47], p. 321). A tentative view of how to approach discussions with patients may be associated with a *lack of patient knowledge*. It was considered that pulmonary rehabilitation is not publicised well enough [44, 47], which results in a difficult sell [34, 40]. Others suggested they would not initiate discussion with COPD patients attending an appointment for a different reason, as they "don't want to listen to you talking about their chest or smoking" ([34], p.285).

In Denmark eight GPs discussed their perceptions of COPD management [50]. Initiated discussion surrounding pulmonary rehabilitation was selective, with GPs only raising it with individuals who they believed would benefit; most were left to "think about it" (p. 1934), and no referral made. GPs perceived people with COPD were apathetic towards pulmonary rehabilitation, and therefore did not encourage, nor promote referral. The small sample size and lack of demographic details were limiting factors.

Lack of services: Shortage of programmes was considered a deterrent to referral [34], with a lack of established programmes highlighted [33, 34, 38, 51]. This was

reinforced in a quantitative national survey in the USA, which gathered responses from primary care physicians (n=523), pulmonologists (n=528) and patients (n=1023). A significant barrier to referral reported by 60% of primary care physicians and 41 % of pulmonologists was although there was an established programme, availability was limited [39].

Having staff with appropriate qualifications to deliver pulmonary rehabilitation, was an issue [39, 40, 45, 54]; some programmes were only delivered with a sufficient number of people enrolled, and delayed if not enough individuals accepted referral [40]. Strong views were held by one GP who perceived pulmonary rehabilitation should be restricted to the newly diagnosed, and re-attendance not offered [50].

Practical Barriers:

Transport and location: In Saudi Arabia, 72% of healthcare professionals (n=123) listed issues with transportation [38]. This was consistent regardless of location, as it was also considered a challenge for people with COPD to use public transport to attend pulmonary rehabilitation in Australia [40]; many patients had limited knowledge of transport options in Canada [42]. Similarly, a grounded theory study, with UK healthcare professionals (n=8), highlighted that programmes should be established in locations accessible to people who require the service [54]. It was however not apparent that any theory was generated, therefore questioning the appropriateness of the methodological approach. Furthermore, those who delivered pulmonary rehabilitation were concerned about room sizes and temperature for exercise [48].

Added strain and commitments for family members was discussed, with time required to take relatives to pulmonary rehabilitation thought to impact daily life [47]. It was perceived that location and distance had significant bearings on attendance or if healthcare professionals would consider referral [44, 48, 50]; parking was also considered expensive [42].

L*ong waiting lists:* Some perceived extensive waiting lists may result in loss of motivation to attend [47]. Wait times were considered too much pressure for patients [40], with some healthcare professionals wondering if it was “worth telling them about it [pulmonary rehabilitation]” ([34], p. 284). It was viewed healthcare professionals sometimes withheld referral decisions from patients, due to perceiving considerable waiting lists as a barrier [44].

Complicated referral process: Some did not “know how to access the programme”, and were unaware they could refer as GPs ([47], p 321), others forgot they could refer [46]. This was comparable with the notion that some were unsure how to make a referral [34, 40]. These papers did not substantiate why healthcare professionals were unacquainted with the referral process. Other possible reasons have however been provided elsewhere, with insufficiency in referrals attributed to unfamiliarity with eligibility criteria [41, 44]. Healthcare professionals agreed the referral process was arduous and convoluted [34, 40, 44] and stressful for patients, who are required to complete lengthy documentation [40].

Patient Barriers to Pulmonary Rehabilitation:

A small number of papers discussed healthcare professionals’ perceptions of patient barriers [38, 39, 40, 48, 50]. These were reported as: disliking the group setting [38], current smoking status [38, 39], affecting an established routine [38], limited support

from family and friends [38], being too depressed to attend [50], and not wanting to attend [40, 48].

Unsure it is their Role:

Not considered their job: Both primary and secondary care practitioners emphasised they were unsure of their role within the referral process, and believed pulmonary rehabilitation was not associated with their job [44, 51]. Others reported uncertainty around who should make referrals within primary care [34, 41], with no structured practice guidelines available [41].

There was a lack of certainty of roles and responsibilities in primary care. Practice nurses felt burdened and solely left to help those with COPD manage their condition [34]. GPs reinforced this, highlighting they should only see people during an acute exacerbation, as it is not their role, nor of high importance, to discuss “preventative type measures” ([34], p. 283). Similarly, other GPs perceived that discussion of non-pharmacological management should be the responsibility of those working in health centres, as they are “better” at it ([50], p.1932).

Overlook the role of referral: In certain instances healthcare professionals passed the buck rather than taking responsibility [34, 44, 50]. Some were aware of pulmonary rehabilitation, however admitted they had become “lazy”, and would place greater importance on it if there was no other healthcare professionals to refer ([50], p.1932). This dismissive attitude was heightened with other GPs stating they “clearly do not want to deal with this [pulmonary rehabilitation]” ([50], p.1932). Many GPs did not place a high importance on non-pharmacological treatments and would not consider referral [44, 50]. A study conducted in Taiwan [43] using questionnaires with nurses in chest medicine (n=93) and nurses in general medicine (n=191),

highlighted that only 18.6% of general nurses and 29.1% of chest nurses promoted pulmonary rehabilitation to patients. This may be as a result of the nurses in this study reporting there is additional energy required to respond to issues surrounding the programme.

Theme Two: General Perceptions of Pulmonary Rehabilitation

Theme two comprises of five synthesising arguments: Suggestions for improvement, unsure of the benefit, the programme is positive, perceptions of patients who are referred to pulmonary rehabilitation, and facilitators to referral.

Suggestions for Improvement:

Improving pulmonary rehabilitation was the most practical aspect to emerge, with healthcare professionals providing positive suggestions for programme change.

Programme change: Suggestions for improvement included providing supplementary support such as DVDs, information, and community based assistance following pulmonary rehabilitation [54]. It was also suggested that pulmonary rehabilitation should be conducted in a cohort, to enable creation of relationships and peer support [54]; this was consistent with the view that partners should be involved [49]. GPs believed it may be possible to substitute pulmonary rehabilitation with home visits, to monitor the individuals condition and sustain good spirits [50]; others suggested incorporation into the COPD guidelines and providing financial enticements [47].

Suggestions for increasing referrals: Practice nurses suggested pulmonary rehabilitation needs to be better incorporated into COPD management, and positively promoted to patients, supported with evidence that it is beneficial [34]. Some believed the profile of pulmonary rehabilitation needs to be raised [46, 47],

and that attendance would increase if patients understood the programme at time of referral, and were able to appreciate the different components [47].

Healthcare professionals viewed improved awareness would assist with understanding the eligibility criteria [41, 46], and the referral process should be simplified [46]. GPs in particular, felt unsupported and wanted more information on how to refer [47]. Actionable suggestions included education for healthcare professionals to assist with communication of pulmonary rehabilitation [41], which would address concerns raised by others [34, 47]. Prompts to referral on COPD review forms, development of a pulmonary rehabilitation referral practice specific protocol, and memory aids were also highlighted [41]. This reiterates the lack of familiarity, but emphasises healthcare professionals are aware they require extra support. Cochrane et al., [40] created an intervention to assist GPs with referrals in Australia, this involved instructions and partially completed referral forms, and contact details for referral assistance. It should be noted this pilot study ended prematurely, due to a lack of feasibility as a result of patient withdrawal, therefore it is difficult to draw reliable conclusions.

Unsure of the Benefit:

Negative attitude: Some were uncertain of the benefits gained from attending pulmonary rehabilitation [33, 38, 46, 47], and perceived it difficult for a person with COPD to begin exercise [40, 42, 53]. The view that patients require more energy to take part, highlights a lack of confidence in the programme and patients' abilities [50]. Others did not believe the programme would be as beneficial as standard management techniques [38], or deemed medication more important for those with

COPD than health related education [43]. This was reinforced as some suggested they would only be likely to refer patients as a last resort [46].

A USA quantitative survey [33], with physicians, nurse practitioners and practitioners assistants (n=278), highlighted low opinions of the usefulness of pulmonary rehabilitation, with only 3% acknowledging the benefits, another 16% were indifferent. An advantage of this study was that the views of healthcare professionals working in three different locations across the USA were represented. It was however not evident if these findings would be transferable to other countries. Furthermore, healthcare professionals were recruited during training for chronic conditions, with surveys collected within the first 15 minutes of a 70-minute COPD presentation. It was assumed responses represented healthcare professionals' knowledge and attitudes prior to the presentation, and did not consider if information delivered within the first 15 minutes would have impacted this; a similar limitation is noted by Johnston, Maxwell and Alison [48].

The Programme is Positive:

A limited number of papers (n=6) displayed that some healthcare professionals had positive views of pulmonary rehabilitation. It should be noted that perceiving the programme as positive was not a key aspect of the data collected, thus evidence is limited.

Increase in patient confidence: Healthcare professionals recognised that a group setting assists with social and psychological aspects; connecting and creating bonds with others whose circumstances bear a close resemblance to their own [42, 49, 52,55]. The programme was perceived to increase quality of life by giving patients a purpose; this newfound confidence was achieved as pulmonary rehabilitation

provides hope and a more positive outlook on life [52]. A Canadian qualitative interview study with healthcare professionals who delivered pulmonary rehabilitation (n=11), highlighted patients are anxious upon commencement, however healthcare professionals felt a sense of accomplishment when patients recognised their ability to exercise and achieve goals [55]. Similarly, the initial assessment was viewed as an opportunity to encourage, give hope and discuss useful tips, and a chance to improve adherence to pulmonary rehabilitation [42]. The programme was perceived to increase patients' understanding of COPD and exacerbations [54], providing confidence and the ability to recognise worsening symptoms and seek help promptly [47]. In primary care high levels of patient satisfaction were reported, and some GPs regarded pulmonary rehabilitation as advantageous when used in conjunction with support provided by the surgery [50].

Pulmonary rehabilitation increases patient knowledge: Healthcare professionals highlighted that time is dedicated to teach patients step-by-step how to improve inhaler technique [42], increase exercise capacity [49], and educate relatives [54]. A qualitative interview study conducted with healthcare professionals in Portugal [52] highlighted that pulmonary rehabilitation is beneficial as it increases patient knowledge and allows them to successfully self-manage. This study highlighted solely positive views from healthcare professionals regarding pulmonary rehabilitation, however there was only a small amount of discussion within the paper regarding healthcare professionals views, with patients and informal caregiver's perceptions also discussed.

Perception of Patients who are Referred to Pulmonary Rehabilitation:

Need motivation and encouragement: Views from those delivering the service are similar to those of referrers in that patients need motivation to attend, and this should be a personal goal [44, 50]. Many felt the need to encourage individuals with COPD [38, 42, 46], and highlighted it would be beneficial to persuade those who have frequent exacerbations to attend [46]. Some perceived those with COPD would rather have a “magic pill that was just going to fix them”, rather than exercise ([42], p.5).

Pulmonary rehabilitation staff advised that some people initially lack motivation, and need to be eased into sessions, with encouragement that exercise is possible [55], otherwise this could lead to high attrition rates [48]. Similarly those fearful and anxious when entering the course, learned that moderate exercise is achievable and they “are not going to die” or experience an exacerbation ([55], pg 1628). Others admitted they may lose interest with those who are not motivated and willing to learn and modify their behaviour [49]. Depleted motivation was managed by reviewing goals, breaking large goals into manageable ones, to provide an encouraging experience [53]. Pulmonary rehabilitation staff believed it was their role to inspire and provide positive reinforcement, coupled with group support [55].

Some perceived people with COPD are not motivated to try pulmonary rehabilitation, and have become depressed as a result of their condition, and would therefore not manage the programme [50]. These negative perceptions could act as a barrier, as could the assumption that they do not want to attend because they have “got more important things than coming to an exercise programme” ([48], p. 111), or that they will become bored and not complete pulmonary rehabilitation [38]. It is unclear if

people with COPD voiced these concerns, or if these are healthcare professionals' perceptions.

Those who delivered pulmonary rehabilitation emphasised distinct differences in how exercise is approached between genders; this was a notable finding presented in the paper by Witcher et al., [55]. This disparity altered behaviour when delivering the programme. Some viewed strong social aspects to gender, with women requiring bonds to motivate them throughout. Others viewed gender differences physically: "with the women, I found I had to kind of encourage them a little bit more, whereas with the men … some guys would really bump up the treadmill" (p1628).

Facilitators to Pulmonary Rehabilitation:

Barriers were most commonly discussed, however a small number of papers highlighted facilitators to referral. Healthcare professionals being knowledgeable about the benefits [47], healthcare professionals advising patients to attend [49], and motivated patients who initiate referral themselves [42], were believed to facilitate referral. These perceptions complement some of the suggestions on how to improve the referral process.

Discussion:

This is the first systematic review to establish healthcare professionals' perceptions of pulmonary rehabilitation as a management strategy for patients with COPD.

Summary of Evidence:

This review highlighted literature regarding healthcare professionals' perceptions of pulmonary rehabilitation, however most related to primary care. Overall, healthcare professionals predominantly focused upon the perceived barriers to pulmonary

rehabilitation, and this was displayed in all papers except two [52, 55]. Discrepancies in opinion were evident, and although the literature did not provide justification for identified perceptions, it could be proposed that each issue caused a vicious circle of events, resulting in a barrier to referral. Communication appeared to contribute to the issues, displayed by a lack of communication between the service and referrers, resulting in diminished knowledge, or healthcare professionals feeling unconfident in how to discuss pulmonary rehabilitation with patients.

A pertinent positive aspect of pulmonary rehabilitation appeared to be an increase in patient confidence and knowledge [42, 49, 52], this may be due to healthcare professionals receiving positive patient feedback, and therefore altering their perceptions. A number were non-adherent to guidelines, which may be a result of the apparent lack of knowledge in relation to pulmonary rehabilitation [47], or not believing in non-pharmaceutical management strategies [34]. Others did not perceive it their role to be involved with pulmonary rehabilitation [51], or would overlook referral [34]. This may be strongly associated with many being unsure of the benefits, or persons' ability to exercise. If unconvinced of the benefits or individuals capabilities, it is unlikely healthcare professionals would promote and communicate pulmonary rehabilitation effectively to patients. These findings appear to be consistent with the suggested reasons for insufficient referrals highlighted in the pulmonary rehabilitation audit [10, 19], and were further reinforced by an American study by Forest et al., (2006), which assessed speciality referral decision making by physicians (n=142) in primary care [56]. Psychological factors such as having to admit uncertainty to the patient, or another healthcare professionals, acted as a barrier to referral, suggesting that a lack of confidence or knowledge impacts upon referral practice.

Others discussed practical barriers such as transportation and location [54], and long waiting lists [47] in addition to personal barriers such as current smoking status [39] and a dislike of the group setting [38]. No paper acknowledged if patients voiced these concerns, or if they are healthcare professionals' individual perceptions. These findings however, are consistent with literature surrounding patient barriers, in particular travel and current smoking status [57, 58]. The view that people with COPD need motivation and encouragement during pulmonary rehabilitation [42], with apparent gender differences in relation to exercise [55], displays healthcare professionals' categorisation of patients due to their own perceived gender differences, which could impact practice. Similar findings have been evidenced with referral practice in primary care, where gender impacts referral decision making, with physicians more likely to refer males for further tests [56].

Feeling deskilled in COPD management and unable to confidently communicate pulmonary rehabilitation was an undercurrent to the literature, and may provide explanation for a lack of referrals. Deficiency in knowledge, training and education were listed as significant barriers; reiterating that many feel unequipped to manage COPD or refer to pulmonary rehabilitation [45,48]. This may be as a result of a lack of information provided in practice or exposure during training, however no explanation was offered in the literature. GPs in Denmark selected which patients to discuss pulmonary rehabilitation with, and left patients to consider referral [50]. This appeared a result of perceiving that people with COPD would be disinterested in attendance, and abiding by their own criteria for referral. It would be interesting to establish if these views are consistent across Europe and America. Perceived patient barriers to pulmonary rehabilitation were also highlighted, and although not

explicitly stated, these perceptions could also act as a deterrent to referral for healthcare professionals.

Interestingly, there was variation in the quality appraisal scores given, with some papers lacking details regarding the research question and methodology, for example Barr et al., [39] and Yawn & Wollan [33]. No paper was deemed such poor quality that it was discarded as a result; papers were included due to their pertinence to the research question. This emphasises the need for research of high methodological rigour, using samples from larger geographical locations, and healthcare professionals of differing backgrounds.

Some, such as Foster et al., [41], aimed to provide justification that healthcare professionals and patients' attitudes to pulmonary rehabilitation result in a lack of referral, however this was not substantiated by the findings. As these conclusions are not corroborated, this appears to be a view held by the researchers. The results therefore provided details of knowledge surrounding pulmonary rehabilitation and suggestions for increasing referrals, however this information cannot be used to deduce that a lack of referrals are a consequence of opinions surrounding the programme. Thus, it is apparent that further research is required to increase knowledge surrounding healthcare professionals' perceptions of pulmonary rehabilitation and assess if such claims can be substantiated.

Strengths and Limitations of the Review:

A strength of conducting a critical interpretive synthesis was it allowed for the synthesis of different methodological approaches. Critical interpretive synthesis also

supports extraction of data relevant to the research question, rather than whole studies, alongside using a critical approach to interpret findings [23]. A further strength is all articles were screened after reading the full text (n=63), and assessed independently by two researchers (ES and CK). Both agreed that 20 met the inclusion criteria, therefore minimising subjectivity [36]. The added systematic, rigorous and documented nature of each stage of study selection, provides a detailed overview of the literature and allows for replication [59].

Appraisal tools have been criticised as being too general, and dismissive of key factors associated with the research [60]. A tool was therefore selected to encompass questions applicable to quantitative and qualitative methods, thus allowing a score to be calculated for any research design [28]. To ensure relevance to the research question was specifically addressed, an additional question was added. It could be viewed as an inherent weakness that no papers were excluded after obtaining a score. However, as there is currently very limited knowledge surrounding healthcare professionals' perceptions of pulmonary rehabilitation, it was viewed unjust to remove pertinent papers due to poorer quality scores, as inclusion would assist with a clearer narrative. It is advised that factors identified in the quality appraisal should be incorporated into the analysis, to enable readers to understand methodological processes, and draw their own conclusions; this approach was therefore adopted [61].

It could be considered a limitation of this review that only English language papers were included, however as funds were unavailable translation could not be carried out. A large proportion of the studies (n=6) were conducted in Australia. This emphasises the need for further research within Europe and USA, as although healthcare systems are similar, they do differ. Furthermore, two of the Australian

studies were carried out within rural and remote areas [45,48], therefore results may not be transferable to different locations.

Overall, the aims of the review were achieved. The pulmonary rehabilitation guideline highlights that pulmonary rehabilitation is unequivocally effective [7], and it was apparent that many healthcare professionals acknowledged its importance, however due to a lack of knowledge and confidence it is evident that further training is required. The review highlights the main concerns prevalent amongst healthcare professionals, and the findings provide implications for any healthcare system that develops and delivers pulmonary rehabilitation.

Conclusions:

Overall, the critical interpretive synthesis found a scarcity of research was available to directly answer the research question. In particular, there was a paucity of literature surrounding the views of those in secondary care. Although it was evident that healthcare professionals held disparate views, which were often based upon role and location, overall they lacked knowledge surrounding PR and the referral process, and many barriers to referral were highlighted. Healthcare professionals offered suggestions on how to improve referral, and although some could appreciate the programmes value, many were unsure of the benefits gained from attendance.

After extracting relevant data from available literature, it is evident that healthcare professionals are not referring patients to pulmonary rehabilitation as frequently as they should. Whether this is due to their own beliefs, lack of programme knowledge or communication skills, should be questioned.

Based upon the current lack of quality surrounding the evidence base, it would be difficult to make recommendations for practice or to increase referral uptake.

Therefore, there is an evident need for research of high methodological rigor with a sole focus on healthcare professionals' views of pulmonary rehabilitation as a management strategy for COPD. Views should be obtained in both primary and secondary care, gathering their perceptions of barriers and facilitators to referral. COPD patients are frequently admitted to general medical wards with other comorbidities, however whilst conducting the review it was noted that the views of those working there are not represented, although they have the ability to refer. This therefore is another avenue for exploration.

The effectiveness of pulmonary rehabilitation for patients with COPD is proven and it encompasses vast benefits relating to general health, education and wellbeing. It is therefore vital that healthcare professionals have a good understanding of their local service, promote and refer eligible patients.

Declaration of Interest:

The authors report no conflicts of interest

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Figure Captions:

FIGURE 1 Critical interpretive synthesis method adapted from the methodology proposed by Dixon-Woods et al., [22].

FIGURE 2 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [37] flow diagram of records identified at each stage.

TABLE 1: Inclusion and Exclusion Criteria

Inclusion Criteria:	**Exclusion Criteria:**
The study establishes healthcare professionals' perceptions of pulmonary rehabilitation as a management strategy for patients with COPD; in full or as part of a larger study.	Does not include healthcare professionals' perceptions of pulmonary rehabilitation as a management strategy for COPD, or only includes patient perceptions.
Written in English.	Paper unavailable in English.
Conducted between 1988-2018.	Any research conducted prior to 1988.
Primary research study with a clear and detailed method.	Discussion or review papers, or studies without a clearly stated methodology.

TABLE 2: Study Summaries

Authors/ Year	Location	Methodology	Participants	Emphasis of Study	Quality Appraisal Score	Main Data Extraction Elements Relevant to the Review Question
Alsubaiei et al., (2016) [38]	Saudi Arabia	Cross -sectional questionnaire	123 participants: 44 physicians, 49 nurses, 30 respiratory therapists/ technicians.	To establish healthcare professionals' views of barriers in establishing a pulmonary rehabilitation programme in Saudi Arabia.	34	Data largely from healthcare professionals unfamiliar with pulmonary rehabilitation (n=119). **General perceptions of Pulmonary Rehabilitation:** - 4.5% of physicians, 36.7% of nurses, and 3.3% of respiratory therapists/ technicians believed standard management is more beneficial than pulmonary rehabilitation (p<0.0001). - 91% believed COPD patients would attend. **Healthcare professionals' perceived barriers to establishing a pulmonary rehabilitation programme:** - 75.6% "the capacity of the hospital does not allow us to set up a pulmonary rehabilitation programme". - 72.4% did not have trained staff to deliver pulmonary rehabilitation. - Costs more than traditional management (p<0.032); small population of COPD patients (p<0.005); pulmonary rehabilitation not appealing to healthcare professionals (p<0.0001). **Perceived patient barriers to pulmonary rehabilitation:** - Smoking status (76.2%) - Affecting routine (59.8%) - Accessibility/ transportation (59%) - Dropout rates (55.7%) - Patient disinterest (45.9%)

						- Limited support from family and friends (41.8%) - Patients not perceiving the programme as helpful (38.5%) - Dislike group setting (30.3%) - Lack of persuasion from healthcare professionals (23%)
Barr et al., (2005) [39]	USA	Quantitative: Survey	523 primary care physicians and 528 pulmonologists. Patients with COPD.	To identify healthcare professionals and patients' perceptions of the care involved with COPD.	28	**Beliefs about pulmonary rehabilitation:** - 63% of healthcare professionals expressed pulmonary rehabilitation would benefit patients with moderate COPD, 76% of primary care physicians and 77% of pulmonologists viewed it would benefit severe COPD patients. - 19% of primary care clinicians and 54% of pulmonologists referred regularly. **Perceived barriers to pulmonary rehabilitation:** - Costs and poor insurance coverage. - Availability of the programme.
Cochrane et al., (2016) [40]	Australia	Mixed Methods: COPD algorithm created, intervention carried out. Interviews with healthcare professionals/stake-holders on barriers and viability of the intervention.	Qualitative: 7 participants: specialist respiration physician, registered nurse, case co-ordinator, GP and three patients. Quantitative: 12 COPD patients.	To explore the views of stakeholders, healthcare professionals and patients on a multidisciplinary pulmonary rehabilitation based intervention.	31	**Perceived barriers surrounding pulmonary rehabilitation:** - Healthcare professionals highlighted GPs were unfamiliar with making referrals. - Healthcare team perceived it challenging to convince patients of benefits; better patient education required. - Respiratory nurses perceived the referral process demanding. - Waiting times.

Foster et al., (2016) [41]	UK	Participatory Action Research: Semi-structured questionnaire followed by actionable changes. Also questionnaires for COPD patients.	9 GPs, 13 practice nurses and 126 patients.	To identify and create strategies to increase referrals to PR.	34	**Poor knowledge of pulmonary rehabilitation, especially from GPs:** Suggested and implemented strategies to increase referrals. This included: running sessions at the GP practice to increase awareness, memory aids, prompts on yearly review forms, and development of a pulmonary rehabilitation referral practice specific protocol.
Guo and Bruce (2014) [42]	Canada	Qualitative: Focus group. Also separate focus groups with COPD patients.	7 healthcare professionals involved in the delivery of pulmonary rehabilitation, and 25 patients.	To establish the perceptions of attendance and completion of pulmonary rehabilitation.	32	**Benefits of pulmonary rehabilitation:** - Increased socialisation and group setting reinforces inclusion, increases confidence and self-belief. - Increases patient knowledge. **Barriers to pulmonary rehabilitation:** - Programme accessibility and expensive parking. Limited patient knowledge of transport options. **General perceptions:** - Patients most in need lack confidence to improve their quality of life, and are less active. - Motivated patients initiate referral. - If patients are provided with tips, and convinced of benefits in pulmonary rehabilitation assessment, it provides hope and they are more likely to attend sessions.

Guo et al., (2018) [43]	Taiwan	Quantitative: Questionnaires	284 Nurses working in chest medicine or general internal medicine, recruited from 3 hospitals in Midwest Taiwan. 93 nurses in chest medicine, and 191 from general internal medicine.	To establish attitudes, knowledge and views surrounding pulmonary rehabilitation and intentions to discuss the programme with patients.	34	**Perceived barriers surrounding pulmonary rehabilitation:** - Many of the nurses reported not referring to PR, with some identifying that there was additional energy required to respond to issues surrounding the programme. From the general internal medicine nurses 18.6% reported promoting pulmonary rehabilitation, with only 29.1% of the chest medicine nurses identifying that they adopted this role. - Pulmonary rehabilitation was not considered a priority with aspects such as medication deemed more important for patients with COPD (38.7% of chest nurses, and 48.9% of general nurses). - Perceptions of pulmonary rehabilitation had a considerable impact upon the nurses' behavioural intentions to inform patients of the programme and encourage attendance.
Harris, Hayter and Allender (2008) [34]	UK	Qualitative: 5 focus groups conducted.	21 healthcare professionals: 9 GPs, 2 GP registrars, 7 practice nurses, 2 community matrons and one healthcare assistant.	To establish barriers and facilitators to referring COPD patients to pulmonary rehabilitation.	37	**Perceived barriers surrounding pulmonary rehabilitation:** - Lack of clarity, whose role it was to refer. - Lack of knowledge about pulmonary rehabilitation and the referral process. - Long wait times. - Communication issues when introducing pulmonary rehabilitation and time associated with discussion.

Johnston et al., (2011) [44]	Australia	Qualitative: Interviews	16 participants: 9 hospital medical practitioners and 7 GPs.	To identify healthcare professionals experience of evidence-based care recommendations for COPD.	31	**Perceived barriers surrounding pulmonary rehabilitation:** - Not their role to refer. - Unclear on eligibility criteria, referral process and waiting lists. - PR is not publicised well enough, resulting in less referrals.
Johnston (C) et al., (2012) [45]	Australia	Descriptive cross-sectional, observational survey design (anonymous questionnaire).	31 healthcare professionals completed a pre-workshop questionnaire, before a Breathe Easy, Walk Easy training session.	To assess confidence levels and knowledge of healthcare professionals providing management strategies for patients with COPD.	33	**General perceptions of pulmonary rehabilitation:** - 77% viewed pulmonary rehabilitation as important by their health service. - Unconfident in COPD management. - Lack of staff. - Financial difficulties. - Deficiency in knowledge and training.
Johnston (K) et al., (2012) [46]	Australia	Mixed methods: Semi-structured interviews with healthcare professionals. Quantitative analysis on patient data, which included adherence to COPD recommendations.	9 hospital doctors (General medical registrars and interns), and 15 patients.	To establish the implementation of COPD management recommendations, what was expected in comparison to what was implemented. If expected practices differed to those carried out, views were sought to establish the perceived barriers/ facilitators to implementation.	26	**General perceptions of pulmonary rehabilitation**: - Doctors admitted they infrequently referred patients, and were more likely to refer those with severe COPD, on maximal therapy. - Those who referred to pulmonary rehabilitation, highlighted the significance of communicating programme benefits at referral. - Pulmonary rehabilitation needs publicity. A lack of awareness resulted in forgetting to refer.

Johnston et al., (2013) [47]	Australia	Qualitative: Semi-structured interviews	12 GPs.	To explore GPs perceptions of the barriers and facilitators to referral to pulmonary rehabilitation.	34	**Barriers to referral:** - Lack of knowledge about pulmonary rehabilitation, COPD and the referral process. - Issues with transportation. - Long waiting lists. - Uncertain of benefits gained. - Difficulty selling the programme. - **Perceived facilitators to referral:** - Knowledgeable of the benefits. - Suggested making pulmonary rehabilitation part of COPD patients standardised care plan, and issuing incentives. - Raising HCP, patients and public awareness. - Information regarding pulmonary rehabilitation services.
Johnston, Maxwell and Alison (2016) [48]	Australia	Qualitative: Interviews and survey comments.	25 healthcare professionals who attended a session on pulmonary rehabilitation completed a survey. 16 completed the survey at three month follow up and seven at the 12 month. 11 healthcare professionals participated in interviews.	To explore the opinions, attitudes, and beliefs of healthcare professionals regarding the establishment and delivery of pulmonary rehabilitation.	31	**The healthcare professionals perceived:** - They lacked pulmonary rehabilitation knowledge. - Considered COPD patients challenging. Required healthcare professional's to have a specific skill set, rather than a generalised one. - Patients do not want to attend. - Worried about asking a COPD patient to exercise.

Meis et al., (2014) [49]	The Netherlands	Qualitative: Focus groups and semi-structured interviews.	14 healthcare professionals in associated disciplines. Also, 7 patients starting pulmonary rehabilitation and 6 patients at the end of the programme.	To establish the perceptions of patients attending or who have attended in-patient pulmonary rehabilitation, and the support provided by healthcare professionals.	35	**General perceptions of pulmonary rehabilitation:** - Patients need to be motivated to increase activity; it is their goal. - Sense of accomplishment when patients can do more. - Bonds and friendship are created with others in a similar situation. - Pulmonary rehabilitation should incorporate partners.
Molin et al., (2016) [50]	Denmark	Qualitative: Semi-structured interviews.	8 GPs.	To establish GPs' perceptions of their role in rehabilitation, and how patients manage their COPD.	36	**Beliefs surrounding pulmonary rehabilitation:** - Some GPs would not discuss pulmonary rehabilitation if the patient seemed healthy and did not discuss referral themselves. - Many believed it was not their role. **Perceived barriers to pulmonary rehabilitation:** - Patients lack motivation to attend. - Distance to the programme. - Those who have attended once, should not be offered again. - The focus of COPD consultations is on medical treatments.

Motegi et al., (2012) [51]	Japan	Quantitative: Postal survey.	176 surveys were returned from 131 general hospitals, 29 university hospitals and 16 community hospitals. Primarily the survey was completed by the doctor with responsible for the pulmonary department.	To evaluate the implementation of pulmonary rehabilitation in Japan, and to assess communication regarding management strategies between those in primary care and respiratory physicians.	26	**79 of the hospitals did not run a programme**. **General perceptions of pulmonary rehabilitation:** - Lack of service was due to: inadequate work force (90%), not providing revenue (35%), some hospitals not meeting pre-requisites of insurance companies (25%). - Small clinics should provide the service (35%). - 22.4% of respiratory physicians from specialist hospitals believed it was the GP's role to carry out pulmonary rehabilitation.
Souto-Miranda and Marques (2019) [52]	Portugal	Qualitative: Semi-structured interviews	10 healthcare professionals who had previously been involved in the creation or running of a pulmonary rehabilitation programme. Also, 12 patients with COPD and 11 informal carers.	To explore perceptions surrounding the outcomes of pulmonary rehabilitation.	30	**Benefits of pulmonary rehabilitation:** - Enables socialisation with others experiencing the same condition, and reduces isolation. - Provides education which increases knowledge and allows individuals to successfully self-manage. - Patients spend money on the programme, however it reduces the need for medication and hospital admissions.
Summers et al., (2017) [53]	United Kingdom	Qualitative: Interview study	17 physiotherapists	To establish physiotherapists views of goal setting within pulmonary rehabilitation.	35	**Perceptions of goal setting in pulmonary rehabilitation**: - Need to establish individualised goals at the beginning of pulmonary rehabilitation. - Difficult for patients to begin exercising. - Assessing goals can assist motivation. - Focus on exercise goals, however patients may want to achieve something different. - Realistic goals need to be set.

						- Some believed goals need to be failed in order to be re-assessed. **Perceived service issues:** - Differences in services. - Funding issues, and less input from other disciplines. - Time constraints. - Cost effective, however need to justify the service.
Wilson et al., (2007) [54]	UK (Northern Ireland)	Qualitative: Focus groups.	8 healthcare professionals and 32 patients with COPD.	To assess patients perceptions of the aspects which should be included in the educational component of pulmonary rehabilitation, and compare to the views of healthcare professionals.	32	**General perceptions of pulmonary rehabilitation:** - Patients need better understanding of COPD, to reduce exercise anxiety. - Educates patients and their relatives about exacerbations. - Psychological effects as important as physical. - Assists with depression, low self-esteem and smoking related remorse. - Concerns for patients following completion of pulmonary rehabilitation, including the psychological impact. - Location is important. - Additional information needed such as leaflets and DVD's.

Witcher et al., (2015) [55]	Canada	Qualitative: Interviews	26 participants in total: 11 pulmonary rehabilitation staff, 3 community stakeholders and 8 patients with COPD and 4 family members.	To explore perceptions of pulmonary rehabilitation and what affects participation in exercise.	34	**General perceptions of pulmonary rehabilitation:** - Gender differences of how exercise is approached, which can impact healthcare professionals behaviour when delivering pulmonary rehabilitation. - Anxiety and fear amongst patients in relation to exercise. - Motivating patients was key to the healthcare professional's role. - Community aspect of pulmonary rehabilitation is motivating for patients. - Increases confidence and self -efficacy.
Yawn & Wollan (2008) [33]	USA	Quantitative: Survey	178 physicians and 100 nurse practitioners/ physician assistants.	To assess the knowledge, attitudes and beliefs in relation to the diagnosis and treatment of COPD.	23	**Beliefs surrounding pulmonary rehabilitation:** - 16% expressed that they were indifferent about the benefits of pulmonary rehabilitation. - Only 3% perceived pulmonary rehabilitation as useful or very useful.

TABLE 3: Synthesising Arguments and Synthetic Constructs in Theme One

Theme One: Barriers to Pulmonary Rehabilitation		
Synthesising Argument:	**Synthetic Construct:**	**Papers it Appears in:**
Lack of Knowledge	Lacked understanding	[34, 38, 41, 44, 45, 46, 47, 48]
	Lack of patient knowledge	[34, 40, 44, 53]
Lack of Resources	Time	[34, 40, 44, 48,50]
	Uncertainty of how to approach discussion of pulmonary rehabilitation.	[34, 40, 44, 47, 48, 50]
	Lack of services	[33, 34, 38, 39, 40, 45, 50, 51, 54]
Practical Barriers	Transport and location	[38, 40, 42, 44, 47, 48, 50, 54]
	Long waiting lists	[34, 40, 44, 47]
	Complicated referral process	[34, 40, 41, 44, 45, 46, 47]
Patient Barriers	Dislike group setting	[38]
	Current smoking status	[38,39]
	Affects an established routine	[38]
	Limited support from family and friends	[38]
	Too depressed to attend	[50]
	Not wanting to attend	[40, 48]
Unsure it is their role	Not considered their job	[34, 41, 44, 50, 51]
	Overlook the role of referral	[34, 43, 44, 50]

TABLE 4: Synthesising Arguments and Synthetic Constructs in Theme Two

Theme 2: General Perceptions of Pulmonary Rehabilitation

Synthesising Argument:	**Synthetic Construct:**	**Papers it Appears in:**
Improving pulmonary rehabilitation	Programme change	[47, 49, 50, 54]
	Suggestions for increasing referrals	[34, 40, 41, 45, 47]
Unsure of the benefit	Negative attitude	[33, 38, 40, 42, 43, 45, 47, 50, 53]
The programme is positive	Increase in patient confidence	[42, 47, 49, 50, 52, 54, 55]
	Increases patient knowledge	[42, 49, 52, 54]
Perception of patients who are referred to pulmonary rehabilitation	Need motivation and encouragement	[38, 42, 44, 45, 48, 49, 50, 53, 55]
Facilitators to referral	Knowledgeable about the benefits	[47]
	Healthcare professional advising patient to attend	[49]
	Motivated patients	[42]

[1] It should be noted that four of the Australian studies were conducted by Johnston et al.,. To avoid confusion note that one paper is from Catherine Johnston et al., [45] (2012), and three are by Kylie Johnston et al., [44, 46, 47] (2011; 2012; 2013). However, each are separate pieces of research and are viewed as different entities.