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Brief informative title: Community registered nurses' knowledge and strategies to relieve breathlessness in people with chronic obstructive pulmonary disease: a survey study

Abstract

Background: Breathlessness is a distressing symptom for people with chronic obstructive pulmonary disease and may negatively impact on their quality of life.

Aim: To explore the community registered nurses' knowledge of chronic obstructive pulmonary disease and the strategies that they used to promote breathlessness relief to people with chronic obstructive pulmonary disease.

Design: This was a cross-sectional survey study.

Setting: Six community centres in one local health district in metropolitan Sydney, Australia.

Participants: Community registered nurses.

Methods

***Data sources*:** A 73-item survey including the 65-item Bristol chronic obstructive pulmonary disease Knowledge Questionnaire and an open-ended item to outline breathlessness strategies used in clinical practice to support people with chronic obstructive pulmonary disease.

Analysis: Quantitative data were analysed using descriptive statistics and qualitative data were analysed using Gibb's framework to identify the main themes for responses to the open-ended item.

Results: Community registered nurses (n = 59) completed the survey (response rate: 42%). The majority were female (n = 55; 93%). The total mean Bristol chronic obstructive pulmonary disease Knowledge Questionnaire Score was 43. The breathlessness category was the lowest scoring category. Three themes were synthesised from the open ended items; (1) the community nurse's role in

monitoring self-management of medications to relieve breathlessness, (2) the use of non-pharmacological strategies to relieve breathlessness, (3) the nursing skills used to monitor breathlessness in people with chronic obstructive pulmonary disease.

Conclusion: Community nurses' knowledge scores suggested a good level of knowledge although there were deficits for breathlessness. The findings provide insight into the chronic obstructive pulmonary disease knowledge and breathlessness strategies used by community nurses. These community nurses used self-management principles to provide support for a range of pharmacological and non-pharmacological strategies. These strategies can support the debilitating and distressing symptom of breathlessness for people with chronic obstructive pulmonary disease.

Key words: Breathlessness, community nursing, chronic obstructive pulmonary disease, survey.

Implications for patient care

- Breathlessness is a subjective experience, which may be difficult for clinicians to recognise.
- People with chronic obstructive pulmonary disease who experience chronic breathlessness are at an increased risk of hospital presentation.

Impact

- The study explored the community registered nurses' chronic obstructive pulmonary disease (COPD) knowledge and the strategies that they use to promote breathlessness relief to people with COPD.
- The main findings indicated that community nurses had a role in monitoring self-management of medications to relieve breathlessness; were aware of the use of non-pharmacological strategies to relieve breathlessness and described nursing skills they used to monitor breathlessness in people with COPD.
- The findings suggest that community nurses play a key role in managing health care for people with COPD.

Reporting method

No Patient of Public Contribution

What does this paper contribute to the wider global clinical community?

- Community nurses provide breathlessness support to people with COPD using a range of pharmacological and non-pharmacological strategies.
- Healthcare system processes should be evaluated to ensure that people with COPD are provided individual tailored support with access to treatments and support for their chronic breathlessness.

Protocol registration

[redacted] Human Research Ethics Committee Registration number: [redacted]

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is the third leading cause of global deaths (World Health Organization, 2017). The World Health Organization (2017), estimates that there are 251 million people diagnosed globally with moderate to severe COPD. Of people diagnosed with moderate to severe COPD 8% or around 3.17 million are associated with global annual deaths (WHO, 2017).

The prevalence of COPD in Australia is approximately 4.8% of people aged over 45 years. However, this percentage could be higher as symptoms are often not reported early, which often delays diagnosis and clinical testing (Australian Institute of Health & Welfare, 2020). COPD has a significant disease burden, and cost the Australian health system over AUD 970 million or 24% of chronic respiratory disease expenditure (AIHW, 2020).

COPD is characterised by airflow limitation, mild to moderate shortness of breath and is irreversible (Global initiative for chronic obstructive lung disease, 2020). People with COPD incur frequent clinical exacerbations, and in later stages there is a progressive deterioration in physical status, a high symptom burden, increased social restrictions and psychological stressors that impact on quality of life (GOLD, 2020).

With the increasing rates of chronic disease, there has been a shift in focus away from delivering acute care services towards more integrated primary health care in the community setting (Australian Institute of Health & Welfare, 2020). Australian health care expenditure on primary health care exceeds that spent on public hospitals (AIHW, 2020). In New South Wales (NSW) the publically funded Chronic Disease Management Program was implemented by community nursing services to reskill their workforces to better support self-management in people with chronic diseases (The George Institute for Global Health, The Centre for Primary Health Care and Equity UNSW, & The Centre for Health Economic Research and Evaluation UTS, 2014).

In Australia, community nursing services are an integral part of primary healthcare and are funded by state and local government sources. Community services are often provided in the home and for people with chronic diseases they are ideally placed to provide symptom support for positive behaviour change (Wagner, 2000). Community nurses have a diverse range of healthcare skills that include, health promotion, disease prevention, chronic disease management, rehabilitation and palliation (World Health Organization, 2017). In general chronic disease management skills include patient assessment, monitoring, education, direct care, coordination of services and supporting access to medical care (McHugh, Horne, Chalmers, & Luker, 2009). These skills are supported by self-management models that have focused on improving motivation, resilience and confidence of people with chronic diseases, to take a more active role in their healthcare (Wagner, 2000).

Evidence suggests that carers and people with COPD feel supported by community nurses who attend to them at home, as this improves their quality of life (Wong, Carson, & Smith, 2012). However, little is known about the clinical expertise, knowledge and understanding that community nurses have about managing the symptom burden of breathlessness for people with COPD. Kirkpatrick, Wilson and Wimpenny, (2012) reported that community nurses predominantly managed the symptom burden of COPD, using a pharmacological model, suggesting this could result in missed opportunities to provide effective non-pharmacological symptom management strategies.

BACKGROUND

Breathlessness is a common debilitating symptom experienced by people with COPD. It is defined by the American Thoracic Society as a subjective experience influenced by physiological, emotional, social and environmental factors (Parshall et al., 2012). It is now more widely understood that physiological changes contribute to breathlessness sensations of varying intensity and duration, that impact on quality of life, psychological wellbeing and functional status (Spathis et al., 2017). For people with COPD the experience of worsening breathlessness can increase the frequency of hospital presentations (Hutchinson, Pickering, Williams, Bland, & Johnson, 2017; Prekker et al., 2014). People

with COPD also experience a higher symptom burden, that is associated with decreased cardiovascular fitness and this may negatively impact on their mortality (Parshall et al., 2012). Best practice treatments such as pulmonary rehabilitation where people with COPD learn self-management strategies improve outcomes but chronic breathlessness often persists (Parshall et al., 2012).

Community nurses work in a diverse range of clinical settings, including the home environment, where they often undertake assessments of people with COPD and make referrals to specialist COPD services (Guo et al., 2018). Yet there has been limited research into community nurses' knowledge of COPD symptoms, treatments and management for breathlessness. However, a small number of validated tools have been used to assess COPD knowledge, such as the Bristol COPD Knowledge Questionnaire (BCKQ) (Blackstock et al., 2018; White, Walker, Roberts, Kalisky, & White, 2006). The BCKQ is recognised in international pulmonary rehabilitation guidelines as best suited to assessing COPD knowledge before and after education (Blackstock et al., 2018).

The BCKQ has been used to assess the COPD knowledge of groups of acute care nurses and clinicians working in primary and secondary COPD services. For example, Guo et al (2018) undertook a cross sectional survey using the BCKQ to compare the COPD knowledge, attitudes and intentions to refer people with COPD to pulmonary rehabilitation. The response rate for this sample of generalist and specialist respiratory nurses was 84%. For generalist nurses (*n* = 191) the mean total BCKQ score was 58 and 61 (*n* = 93) for specialist respiratory nurses (Guo et al., 2018). Interestingly, Ma et al. (2019) translated the BCKQ into Chinese and compared the COPD knowledge of respiratory and non-respiratory nurses, working in an acute care setting. The findings revealed a total mean score of 35; 39 for respiratory nurses and 33 for non-respiratory nurses. The knowledge deficits in the respiratory nurses group were for the categories of epidemiology, breathlessness, oral steroids and inhaled steroids (Ma et al., 2019).

Edwards and Singh (2012) also used the BCKQ to evaluate the COPD knowledge of clinicians working in primary and secondary care COPD services. The findings were reported as a mean score of 50 with

the number of correct responses ranging from 24 to 62. Knowledge deficits were reported in the categories of breathlessness, the mean score 3.3 (66%) and in the medication topics for the inhaled steroid category there was a mean score of 2.7 (54%). To date the tool has not been used to evaluate community nurses knowledge of COPD. Therefore, the aim of this study was to explore community registered nurses' knowledge and the strategies they used to manage the symptom of breathlessness in people with COPD.

METHODS

Study design

This study was a cross-sectional survey. The study was reported with reference to the Checklist for Reporting Of Survey Studies (CROSS) (Sharma et al., 2021).

Site

The study was conducted across six local community nursing centres within a community nursing service in a metropolitan Local Health District (LHD), in Sydney, Australia. The community nursing service was funded by the Australian and NSW State governments and provided general and specialist nursing care to people in their homes.

Clinicians such as community nurses undertook patient monitoring by performing routine measurements to detect changes in disease or health status (Stedman's Medical Dictionary 2016). The parameters that determined respiratory disease monitoring were guided by evidence of acute or chronic disease and this varied between the hospital and home settings. In the home setting, community nurses undertook chronic respiratory disease monitoring using physical assessment, symptom monitoring, and history taking.

Sample

A convenience sample of registered nurses working in a community nursing service (n = 140) were approached to participate. Inclusion criteria included: registered nurses working either fulltime, part-

time or casual. Enrolled nurses were excluded as they did not undertake respiratory monitoring within the community nursing service.

Data collection

Survey

The anonymous survey comprised of 73 Items including the BCKQ (65 items) (White et al., 2006). There were five demographic items (gender, employment status, years of experience, attendance at chronic respiratory education fora and post graduate qualifications), two items based on a five point Likert scale (from 1 – not at all, 2 - a little, 3 – moderately, 4 – quite a lot, 5 – always) to evaluate confidence with respiratory monitoring skills and COPD knowledge, developed by the researcher and an open ended item requesting community nurses outline the breathlessness strategies they used in clinical practice to support people with COPD. The items were developed to capture an understanding of the potential isolation associated with working outside of the acute care setting and impacts on the knowledge and confidence of community nurses monitoring disease parameters for people with COPD (Schutz, 2007). The eight items were pilot tested by four experienced specialist clinicians who indicated that the survey had face validity and reflected expectations of community nurses' scope of practice.

Bristol COPD Knowledge Questionnaire

The BCKQ was used with permission of the developers. The BCKQ is a validated tool and comprises 65 questions and 13 categories each with 5 multiple choice items requiring a response 'true' or 'false'. The COPD knowledge categories explore aetiology, prevention, management and symptoms including breathlessness. To determine COPD knowledge deficits, responses to each category are summed. A total mean score is determined by summing all the correct responses in each category and dividing by the number of items. Total scores range from 0 to 65; higher scores indicate better knowledge. The categories of the BCKQ were considered to be representative of the COPD knowledge that might be expected of community nurses. The BCKQ has been extensively validated and has good internal

consistency (Cronbach's alpha: 0.73) and good test-retest reliability (r=0.71, *n*=54, *P* <0.001) (White et al 2006). For the purpose of the current study a mean score below 40 indicated a knowledge deficit.

The researcher ([redacted]) attended each of the community centres in which the registered community nurses worked on two separate occasions to provide information about the study and to invite the nurses to participate. The paper surveys were placed at the back of the education room by the researcher who left the room so that those nurses present were able to voluntarily and anonymously complete the survey. Community nurses who agreed to participate completed the survey and placed it in a secure box, which the researcher later collected.

Data analysis

A sample size was not estimated for this study; all community nurses working within the study community nursing service were invited to participate. Descriptive statistics (frequencies, percentages, means and standard deviations) were calculated and used to summarise the quantitative data for example demographic characteristics and BCKQ scores. An inductive approach to thematic analysis was undertaken for the data for the responses to the open ended item requesting participants to outline the breathlessness strategies they used in clinical practice to support people with COPD. Gibb's framework (2018) was used which included 1) initial familiarisation and data transcription; 2) building codes and patterns; 3) the development of themes; 4) and the consolidation and interpretation of data. This inductive approach resulted in the emergence of patterns that provided the researcher a context for the respondents' clinical practice. These patterns were discussed by the authors who then reviewed the coding of themes and their interpretation. One of the authors ([redacted]) is an expert qualitative researcher and was able to verify that the coding and patterns related to the themes.

Ethical considerations

Ethical and governance approval was provided by the [redacted]) Human Research Ethics committee ([redacted]) and the [redacted] Executive. Potential

participants were fully informed about the study aim and purpose and the researcher's interest in understanding their COPD knowledge and the breathlessness support they provided to people with COPD before providing consent. No personal details were collected ensuring the privacy and confidentiality of participants. Participants were informed that completing and returning the survey implied consent. Data were stored in a password locked computer in Excel and NVivo v12.

RESULTS

A total of 59 community registered nurses completed the survey (response rate: 42% based on population of 140 community nurses). All items were completed. The mean time taken to complete the survey was 20 minutes. The majority of respondents (*n* = 55; 93%) were female, with a mean of 22 ±20 (range: 2 days-50) year's registered nurse experience. Respondents had an average 11.2 ± 10 (2 days-33.4) year's experience as a community nurse (Table 1). The majority worked fulltime (*n* = 45; 75%) and had attended a chronic respiratory education forum (*n* = 40; 67.8%).

Over 50% of respondents (*n*=31), ranked their confidence with COPD knowledge as moderate. Their confidence to provide respiratory monitoring ranged between 3 (moderately) [*n*=28; 46.6%], to 4 (quite a lot) [*n* = 20; 34.4%].

The total mean score for correct responses to the BCKQ was 43. The highest scoring categories were 'vaccination' and 'infections'. The breathlessness category (35.2) scored the lowest (Table 2).

Community nurses identified a range of breathlessness strategies that targeted self-management principles, comfort and medication management. Three themes were synthesised, 1) the community nurse's role in monitoring self-management of medications to relieve breathlessness; 2) the use of non-pharmacological strategies to relieve breathlessness; and 3) the nursing skills used to monitor breathlessness in people with COPD.

Theme 1. The community nurse's role in monitoring self-management of medications to relieve breathlessness

To better manage breathlessness in people with COPD at each home visit, community nurses monitored and assessed medication compliance with regular and intermittently prescribed respiratory medications. Prescribed medications were incorporated into the care plan as a key strategy to manage breathlessness. Many community nurses prioritised the self-management of COPD and support to ease breathlessness, by frequently providing education on respiratory inhaler usage, and assessing patient technique.

> *"I ensure they know and take their medications and [respiratory] puffers and have a plan of care that they can understand" (Respondent 31).*

And

> *"I correct the use of medications-inhalers and prescription medications to support breathlessness." (Respondent 52).*

In addition to using respiratory inhalers to control chronic breathlessness some respondents detailed the person's use of oxygen therapy. If a person was prescribed oxygen some community nurses reported reviewing and monitoring flow rate, usage and consumption during activities of daily living (ADLs). These nurses optimised the person's activities using oxygen to better manage breathlessness. To illustrate, *"[we should] utilise oxygen therapy (if used) prior to and during activities" (Respondent 47).* The focus was on monitoring oxygen usage for the health trajectory and management of breathlessness. Monitoring of oxygen therapy was required by these nurses however it was prescribed by a medical officer.

Community nurses also reported assessing and reviewing the impact of anxiety and existential distress associated with breathlessness on daily activities. Part of this assessment included reviewing medications and compliance with prescribed analgesics and anxiolytics. They reported assessing,

monitoring and reviewing the effectiveness of morphine and anxiety medications for the relief of breathlessness. To better manage breathlessness a key strategy was to discuss rest and pacing the activities of daily living with people experiencing breathlessness about:

> *"Assistance with ADLs – ensuring help is available…prescription medications to support decrease in shortness of breath and relieve anxiety i.e., Ordine®" (Respondent 57).*

Theme 1 highlighted how respondents supported people with COPD to use prescribed medications to relieve breathlessness. The use of respiratory medication, oxygen therapy, morphine and anxiolytics was a key component of the nurses' care plan to support and enhance self-management of COPD patients. For these community nurses education and ongoing monitoring were the corner stone of best practice.

Theme 2. The use of non-pharmacological strategies to relieve breathlessness

Theme 2 encompassed the non-pharmacological strategies that the respondents used during visits to people, who were experiencing breathlessness. Assessing and providing education about active controlled breathing techniques (ACBT) was a frequently identified strategy. Some respondents provided descriptions of breathing techniques they taught to people with COPD, including pursed lip and deep breathing, for example, "*Practice breathing (in through nose, out through pursed lips)*." (*Respondent 31*).

The nurse's role in providing support for energy conservation breathlessness strategies were detailed. They reported the actions used to support the conservation of energy; when to rest, to pace, to avoid rushing and how to manage ADL activities, reserve energy, and to use short bursts of activity.

Nurses reported assessing symptom recognition by the person with COPD and how they self-managed an exacerbation of breathlessness. Additional statements indicated they liaised with General Practitioners (GP) to authorise medications to manage exacerbations in the person's COPD action

plan. For example, *"Give patient COPD action plan, have GP fill in and then provide education". (Respondent 24).*

Nurses promoted attendance at pulmonary rehabilitation exercise programs or support home based self-directed physiotherapy prescribed exercises. Some nurses reported the use of non-pharmacological strategies to manage breathlessness such as use of a fan and meditation.

Nurses eased breathlessness by promoting a combination of breathing exercises, energy conservation and exercise programs. Management of exacerbation symptoms were supported with a medically completed COPD action plan as the key self-management strategy.

Theme 3. The nursing skills used to monitor breathlessness in people with COPD

Ongoing monitoring, documenting and assessment for COPD deterioration was achieved by measuring vital signs and undertaking chest auscultation. This assessment was used to determine the appropriate intervention. For example, *"Check the vital signs if symptoms persist or desaturation/symptom worsening assess for a hospital transfer" (Respondent 34).* And *"Observations: Especially oximetry and respiratory rate (monitor and assess symptoms especially why are they breathless?)" (Respondent 12).*

History taking including assessing factors that might precipitate the onset of breathlessness was considered an important aspect of managing breathlessness. The recognition of worsening breathlessness resulted in an increase in the frequency of home visits to monitor the person with COPD.

Nurses liaised with other health care professionals for additional support or specific treatments to support people with COPD experiencing breathlessness. Health care professionals included: occupational therapists, GPs, respiratory physicians, physiotherapists and specialised respiratory nurses.

DISCUSSION

This study revealed that community nurses have detailed knowledge of COPD; its aetiology, symptoms and treatments. COPD knowledge evaluated using the BCKQ revealed good COPD knowledge. Mean total BCKQ scores were lower than those reported by both Guo et al (2018) and higher than those reported by Ma et al (2019). However, the low mean scores in the breathlessness category, were consistent with earlier studies (Edwards & Singh, 2012; Ma et al., 2019). This is concerning as there is a risk of under treatment when clinicians do not recognise the symptoms of breathlessness in people with COPD (Lung Foundation Australia, 2020). People with COPD rely on community nurses, to recognise and assess signs of increased breathlessness, and to have the knowledge to support them with appropriate self-management strategies to minimise discomfort and chronic disease (or existential) distress.

Community nurses knowledge of infection and vaccinations for people with COPD in the BCKQ categories was good. Respiratory nurses in a study conducted in China reflected similar levels of knowledge in these categories (Ma et al., 2019). These consistent findings are arguably not unexpected since the symptoms of infection are less subjective than those of breathlessness and the knowledge of vaccination can be rote learned.

The findings of this study suggest that community nurses help people with COPD to self-manage their breathlessness by providing strategies to support them in their home. The nurses implemented an array of non-pharmacological strategies to ease breathlessness and support the relief of exacerbation symptoms. The strategies included: improving function through physical activity, energy conservation, breathing exercises and body positioning. Many strategies reported by community nurses are taught by multi-disciplinary teams in pulmonary rehabilitation programs. (Bolton et al., 2013; Lung Foundation Australia, 2020; Spruit et al., 2013).

Community nurses also offered support through written COPD action plans, liaising with medical and allied professional health teams to access community resources as suggested in the COPD-X plan:

Australian and New Zealand Guidelines for the management of Chronic Obstructive Pulmonary Disease and the Global Initiative for chronic obstructive lung disease (2020; Lung Foundation Australia, 2020). While written COPD management plans are known to reduce the number of hospital presentations secondary to respiratory distress there is more to be understood about the specific support provided by community nurses. An appreciation of this may further improve outcomes for those who self-manage symptoms in the home (Howcroft, Walters, Wood-Baker, & Walters, 2016; Prekker et al., 2014; Zwerink et al., 2014).

In general the type of support provided by respondents in the home setting to people with COPD, has been associated with improved quality of life (Wong et al., 2012). Yet breathlessness has a high symptom burden and previously little was known about community nurses support and management activities. Earlier studies identified a number of non-pharmacological strategies that could improve the quality of life for people experiencing breathlessness (Mahler et al., 2010; Ries, 2006; Zwerink et al., 2014). These strategies included: comprehensive assessments; rating scales of the breathlessness experience; individualised breathlessness plans; and, referrals to specialised symptom management support services, such as palliative care (Lung Foundation Australia, 2020; Mahler et al., 2010).

There is limited evidence to support how often nurses or other health professional are using these individualised non-pharmacological strategies in their clinical practice (Spathis et al., 2017). However, this study did highlight that respondents actively spent time advising and educating people with COPD, on a range of non-pharmacological breathlessness strategies. They also made referrals to allied health clinicians, and specialist respiratory services.

People with COPD often rely on their medications to minimise breathlessness symptoms (Global initiative for chronic obstructive lung disease, 2020). People with COPD are encouraged to self-manage exacerbations of breathlessness, which includes knowing the correct inhaler technique, taking respiratory medications as prescribed and recognising symptoms that require rescue medications (Global initiative for chronic obstructive lung disease, 2020; Lung Foundation Australia, 2020). The

evidence from the current study indicates that during respiratory monitoring, community nurses provided symptom recognition education to improve medication adherence.

However, the responses to the open ended survey item were somewhat surprising in that community nurses did not mention the role of morphine in the management of breathlessness. Evidence suggests that it is effective for managing breathlessness in people with advanced COPD, during periods of exertion (Abdallah et al., 2017; Mahler et al., 2010; Parshall et al., 2012). Its effectiveness is enhanced by adjunct supportive strategies such as comprehensive individualised assessments, the use of a breathlessness rating scale and an outline of pharmacological and non-pharmacological strategies in a breathlessness action plan (Johnson, Currow, & Booth, 2014; Lung Foundation Australia, 2020; Mahler et al., 2010). Arguably these all fall within the scope of community nurses' practice. The findings are inconclusive, as to whether oral morphine was under prescribed for breathlessness or community nurses had not considered it as a pharmacological strategy. Also the respondents may have been influenced by their knowledge of the remit of the researcher's ([redacted]) clinical role and may have not considered this. There was insufficient evidence to determine if the community nurses were knowledgeable or not about the role of oral morphine in the management of breathlessness.

The general role of community nurses in providing medication support has identified that they assess administration abilities, educate people about medications, introduce supportive tools, identify problems with medication and liaise with prescribers (Griffiths, Johnson, Piper, & Langdon, 2004). Future studies should explore patient safety risk factors and the community nurse's role in supporting people with COPD, in the use of oral morphine in their own homes.

Barriers that clinicians face in developing, understanding and applying their knowledge of breathlessness include, access to appropriate breathlessness education; healthcare system paucity of breathlessness relief resources; and inadequate processes to support strategies to relieve breathlessness (Johnston et al., 2020). To date, there is little research that identifies what clinicians need to know about breathlessness to better support people with COPD. However, evidence is

emerging that education, which focuses on the rationale for individualised support for chronic breathlessness has improved community and acute care health professionals' confidence and attitudes when making treatment decisions (Johnston et al., 2020). Future research including people with COPD and breathlessness could improve processes and resources to better support self-management of this condition in their homes.

LIMITATIONS

There were a number of limitations in this study to be considered. Firstly, there was the possibility of sample bias as not all nurses were at work at the time the survey was distributed. The majority of respondents worked fulltime and so part-time or casual nurses may have had different views. Secondly, fatigue may have influenced responses as the survey required 20 minutes to complete. Thirdly, the breathlessness strategies reported by respondents may not reflect what they did in practice, as there was no direct observation undertaken of their clinical practice. Lastly, the community nurses roles are complex and while they have a diverse range of healthcare skills it was possible that they did not report the full complement of breathlessness strategies used at all stages of the COPD health trajectory.

CONCLUSION

This study identified that for this group of community nurses knowledge of COPD was similar to other groups of nurses evaluated in earlier studies. This study identified that community nurses use a range of pharmacological and non-pharmacological strategies to ease breathlessness with a focus on promoting the principles self-management. Current evidence based practice indicates that clinicians should focus on treatments and supportive breathlessness strategies that are tailored to individual needs. The beneficial outcomes for people living with COPD, is to enhance self-management of breathlessness and thus enhance their quality of life.

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Tables

Table 1. Demographic data for community registered nurses (n=59)

Characteristic	Statistic
Gender, female, n (%)	55 (93%)
Employment status, n (%)	
Full-time	45 (75%)
Part-time	13 (22%)
Casual	1 (2%)
Nursing experience, years Mean±SD#, (range)	
Registered nursing	22 ±20 (2 days-50 years)
Community nursing	11 ± 10 (2 days-33.4 years)
CRN^ respiratory forum attended, n (%)	40 (68)
Time period CRN^ respiratory forum attended, n (%)	
2016 – 2018	16 (40)
2014 – 2015	4 (10)
2009 – 2013	3 (7.5)
No date provided	13 (32.5)
Before 2009	4 (10)
Post graduate qualifications, n (%)	
Post graduate certificate	5 (8.5)
Graduate diploma	1 (1.7)
Masters	2 (3.4)
Enrolled in master program	2 (3.4)

Notes: # standard deviation, ^ Community Registered Nurse

Table 2. BCKQ correct responses (*n* = 59)

Topic	a	b	c	d	e	Total mean
Epidemiology	45 (76)	19 (32)	53 (90)	41 (70)	25 (43)	36.6
Aetiology	26 (44)	53 (90)	44 (75)	43 (73)	49 (83)	43.0
Symptoms	35 (59)	51 (86)	43 (73)	52 (88)	46 (78)	45.4
Breathlessness	46 (78)	22 (37)	45 (76)	22 (37)	41 (70)	35.2
Phlegm	27 (46)	29 (49)	25 (42)	56 (95)	52 (88)	37.8
Infections	52 (88)	49 (83)	43 (73)	54 (92)	43 (73)	48.2
Exercise	31 (52)	57 (97)	36 (61)	34 (58)	44 (75)	40.4
Smoking	36 (61)	43 (73)	58 (98)	17 (29)	53 (90)	41.4
Vaccination	57 (97)	58 (98)	59 (100)	54 (92)	25 (42)	50.6
Inhaled bronchodilators	42 (71)	45 (76)	50 (85)	48 (81)	30 (51)	43.0
Antibiotics	45 (76)	44 (75)	59 (100)	47 (80)	39 (66)	46.8
Oral steroids	55 (93)	56 (95)	45 (76)	8 (14)	43 (73)	41.4
Inhaled steroids	55 (93)	35 (59)	41 (69)	53 (90)	13 (22)	39.4
Total score						43

a, b, c, d, e: mean correct score for each item in the category, n (%)

Total mean: total mean scores per category

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Brief informative Title: Community registered nurses' knowledge and strategies to relieve breathlessness in people with chronic obstructive pulmonary disease: a survey study

Short running title: Nurses' knowledge of COPD breathlessness

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The authors know of no conflicts of interest in relation to this work or this publication.

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d. The authors affirm that the methods used in the data analyses are suitably applied to their data within their study design and context, and the statistical findings have been implemented and interpreted correctly.

e. The authors agree to take responsibility for ensuring that the choice of statistical approach is appropriate and is conducted and interpreted correctly as a condition to submit to the Journal.

f. State which of the following main statistical methods/approaches were used. If your method/approach is not shown below, tell us what you used and why:

only descriptive statistics were used in this cross-sectional study