Diagnostic accuracy of respiratory diseases in primary health units

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Summary

Respiratory diseases are responsible for about a fifth of all deaths worldwide and its prevalence reaches 15% of the world population. Primary health care (PHC) is the gateway to the health system, and is expected to resolve up to 85% of health problems in general. Moreover, little is known about the diagnostic ability of general practitioners (GPs) in relation to respiratory diseases in PHC. This review aims to evaluate the diagnostic ability of GPs working in PHC in relation to more prevalent respiratory diseases, such as acute respiratory infections (ARI), tuberculosis, asthma and chronic obstructive pulmonary disease (COPD). 3,913 articles were selected, totaling 30 after application of the inclusion and exclusion criteria. They demonstrated the lack of consistent evidence on the accuracy of diagnoses of respiratory diseases by general practitioners. In relation to asthma and COPD, studies have shown diagnostic errors leading to overdiagnosis or underdiagnosis depending on the methodology used. The lack of precision for the diagnosis of asthma varied from 54% underdiagnosis to 34% overdiagnosis, whereas for COPD this ranged from 81% for underdiagnosis to 86.1% for overdiagnosis. For ARI, it was found that the inclusion of a complementary test for diagnosis led to an improvement in diagnostic accuracy. Studies show a low level of knowledge about tuberculosis on the part of general practitioners. According to this review, PHC represented by the GP needs to improve its ability for the diagnosis and management of this group of patients constituting one of its main demands.

Keywords: respiratory tract diseases, primary health care, diagnosis, general practitioners, review.

Introduction

According to the World Health Organization (WHO), 20% of the 59 million annual deaths by all causes are due to respiratory tract diseases.[1,2] Among these, acute respiratory infections (ARI) occupy third place (3.6 million deaths; 6.1% of the total), while chronic obstructive pulmonary disease (COPD) occupies fourth place, with 3.28 million deaths (5.8% of the total), and will reach third place by 2030 according to projections.[3-5]

More than a billion people worldwide - 15% of the global population - suffer from some kind of chronic respiratory disease, with half affected by one of the two most prevalent conditions: asthma (235 million)[6] or COPD (210 million).[7] Owing to this, around a third of appointments at primary health care (PHC) units worldwide are due to respiratory diseases.[1]

Among the difficulties encountered in PHC in relation to this group of diseases, we can mention imprecision in the diagnosis of asthma and COPD [8-10] and excessive prescription of antibiotics for the treatment of acute respiratory diseases.[1,11,12] In general, little is known about

diagnostic ability and the elaboration of treatment plans for these conditions by PHC physicians, as well as the factors influencing them.

This article presents a review of the literature with respect to the diagnostic accuracy of general physicians in PHC in relation to the most prevalent respiratory diseases and those of greatest interest for public health, including ARI, tuberculosis, asthma and COPD.

Methods

A search of the literature was undertaken for articles assessing the concordance between the diagnosis by PHC physicians and specialists in respiratory diseases for the main respiratory illnesses in PHC services. The review also included studies using supplementary reference exams (spirometry) for asthma and COPD; acid-fast bacilli (AFB) tests for tuberculosis and C-reactive protein (CRP) and procalcitonin for ARI or for making clinical decisions, such as prescribing antibiotics.

The literature review was conducted using the PUBMED database covering the period from 1/1/1992 to 8/1/2012, limited to studies conducted on humans and published in Portuguese, English and Spanish.

In the selection, cross-referencing was performed using these groups of MeSH keywords with free terms (FT) of relevance to the research: "diagnosis" (MeSH), "underdiagnosis" (TL) e "diagnostic concordance" (TL) com "respiratory tract infections" (MeSH), "asthma" (MeSH), "COPD" (MeSH) and "tuberculosis" (MeSH) with "primary health care" (MeSH) and "general practitioners" (MeSH; Figure 1).

As a result of the lack of studies about this issue in the literature, differences in methodology or the definitions of conditions were not used as exclusion criteria, as will be discussed below.

The diseases included in this review were ARI, asthma, COPD and tuberculosis. Articles that included other diseases such as sleep apnea, lung cancer and other respiratory diseases were excluded.

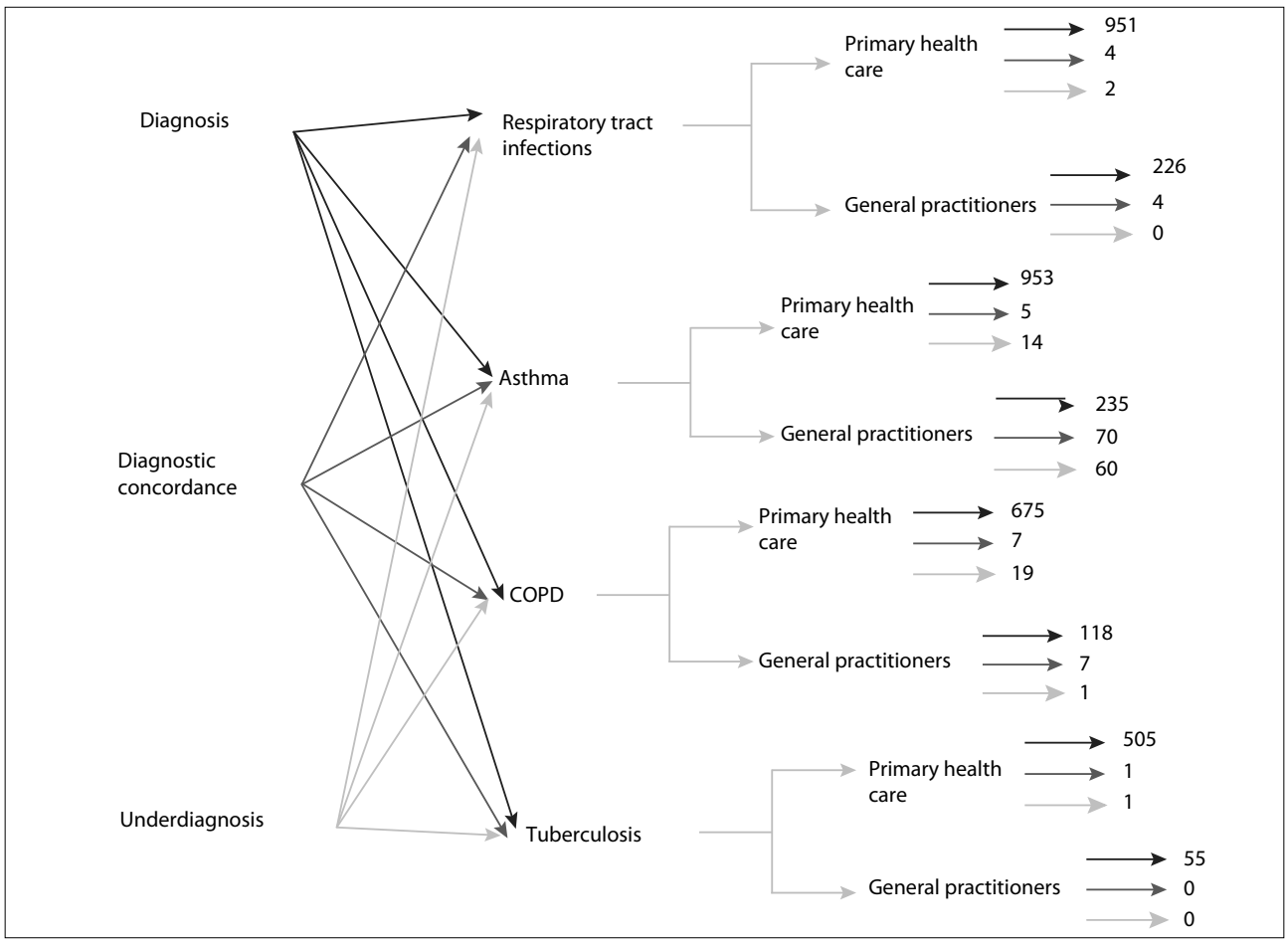

FIGURE 1 System for searching articles according to the keywords and number of articles found in each cross-reference.

Results

Thirty of the 3,913 articles encountered were selected according to the following flowchart (Figure 2).

Articles assessing the diseases of interest were not found in this set. The methodological heterogeneity encountered did not meet the criteria for conducting a meta-analysis. The results will be presented organized as follows: acute respiratory infections, tuberculosis, asthma, COPD, and asthma and COPD in conjunction.

Acute respiratory infections - ARI

Upper respiratory tract infections

Among studies of upper respiratory tract infections (URTI), two used C-reactive protein (CRP) or used it as diagnostic aid, or as a reference method for assessment of diagnostic accuracy.

A single study verified the accuracy of the upper respiratory tract disease diagnosis. The authors evaluated the accuracy of the clinical diagnosis of pharyngitis using CRP dosage and leukocyte count in the two phases of the study.[13] Another study also used the CRP as an auxiliary tool in the diagnosis of acute bacterial rhinosinusitis and prescription of antibiotics.[14]

Only one study assessed the concordance between general practitioners and specialists (pediatricians and ENT specialists) through a standardized questionnaire in the management of children with recurrent tonsillitis. There was disagreement between the signs and symptoms evaluated by the ENT specialists and general practitioners in the diagnosis of tonsillitis, pharyngitis or upper respiratory tract infection.[15]

Lower respiratory tract infections

Studies assessing the concordance or comparing the diagnosis and conduct of general physicians and specialists for lower respiratory tract infections were not encountered. The few studies encountered compared the diagnosis by general practitioners with a reference exam and are grouped in Table 1.[11]

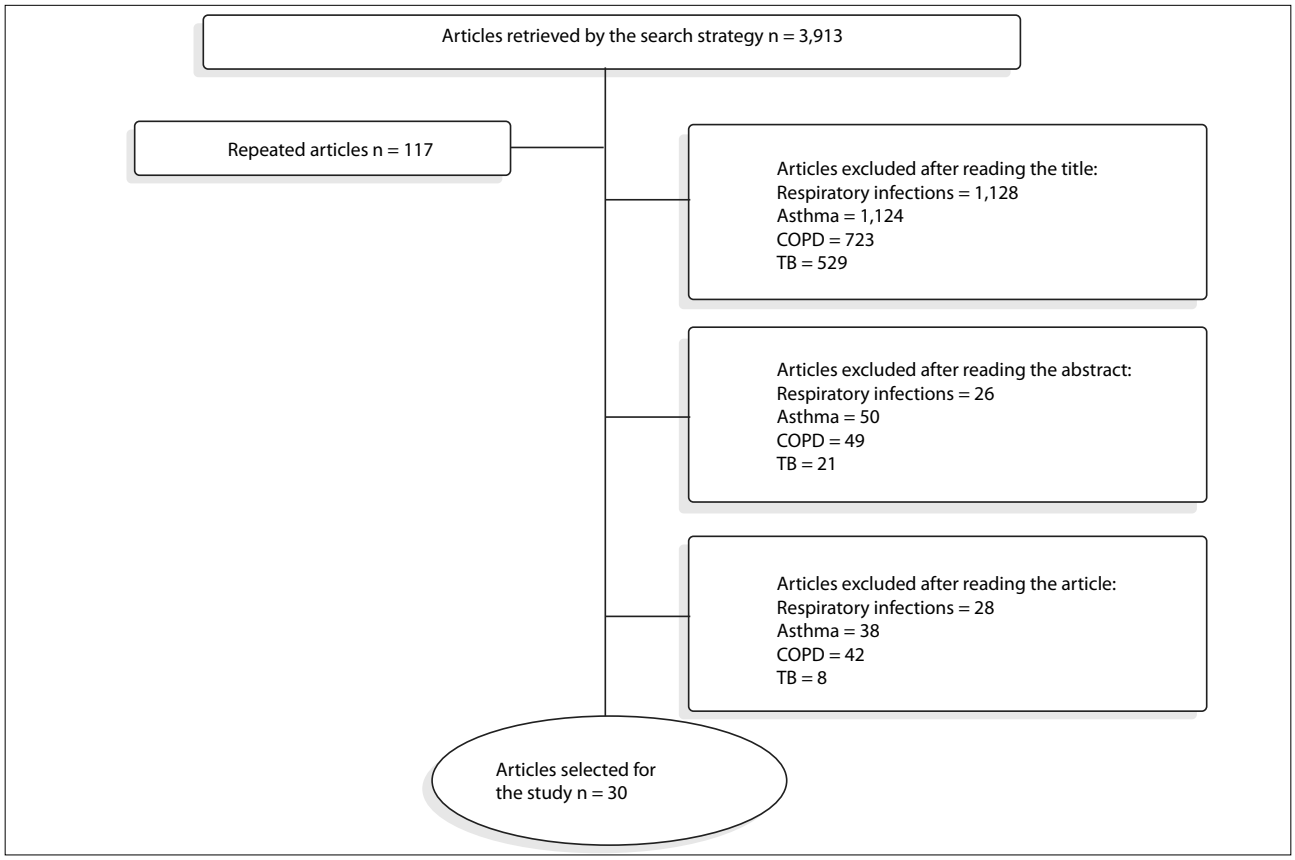

FIGURE 2 Flowchart for selection of articles according to the criteria adopted in the review.

TABLE 1 Synopsis of the articles relating to acute respiratory tract infections (ARI), tuberculosis, asthma, COPD, and asthma and COPD in conjunction

	Ref.[1]	Author, year, country	Main objective	Reference method	Study design	Nº of patients; age group; mean age	Nº of physicians	Results
ARI Upper tract	13	Gulich et al., 1999, Germany	To assess whether the measurement of CRP[2] improves the accuracy of diagnosis of pharyngitis	CRP[2] and leukocyte count in the blood	Cross-sectional	Phase I: 179 Phase II:161;16-75; 34.3	15 phase I 14 phase II	Improvement in accuracy from 70 to 81% when they had access to exams. The ROC curve[3] showed that the diagnostic value of CRP[2] was better than the leukocyte counts (area under the curve = 0.85 *versus* 0.68)
	14	Bjerrum et al., 2004, Denmark	To assess whether generalists using CRP[2] in their practice prescribe fewer antibiotics for sinusitis that generalists who do not	CRP[2]	Cross-sectional	1,444;31-53;40	367	Physicians who requested the test prescribed 20% fewer antibiotics. The request and the level of CRP[2] had a strong influence on prescribing antibiotics for sinusitis
	15	Capper et al., 2001, United Kingdom	To assess agreement between general practitioners, pediatricians and ENT specialists on the conduct among children with recurrent tonsillitis	Non previously validated questionnaire answered by doctors	Cross-sectional	Does not apply	71 GPs, 57 pediatricians, 42 ENT specialists	Little agreement among GPs, pediatricians and ENT specialists about the diagnosis of tonsillitis and indication for tonsillectomy
ARI Lower tract	11	Hopstaken et al., 2002, Netherlands	To evaluate the diagnostic value of signs, symptoms, ESR[4] and CRP[2] for pneumonia	Chest X-ray	Cross-sectional	246; 18-89; 52	25	Of the 246 patients included, 32 (13%) had radiographs consistent with pneumonia. GPs diagnosed pneumonia in 21 patients using only clinical examination. Antibiotics were prescribed for 193 (78.4%) patients. The authors concluded that the prescriptions could have been avoided in 80 (41%) patients with probable diagnosis of acute bronchitis who received unnecessary antibiotics

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TABLE 1 Synopsis of the articles relating to acute respiratory tract infections (ARI), tuberculosis, asthma, COPD, and asthma and COPD in conjunction (continuation)

ARI Upper and lower tract	12	Briel et al., 2008, Switzerland	To compare the usual approach to approach guided by PCT(5)	PCT[5]	Randomized trial	458; 33-63; 48	53	The 458 patients with acute respiratory infections that, in their physicians' opinion, needed antibiotics were randomized to either a group of usual care or a group of care guided according to the results of PCT.[5] When PCT was used by GPs as a discriminating factor in relation to clinical assessment, those who used it received 72% less antibiotic prescriptions than the other group
Tuberculosis	16	Cirit et al., 2003, Turkey	Assessment of knowledge of GPs and pulmonary specialists on diagnosis and treatment of tuberculosis	Analysis of a questionnaire completed by professionals	Cross-sectional	Does not apply	203	Significant difference on knowledge of the diagnosis and treatment of tuberculosis among specialists and generalists in primary care. The main differences were in combination of drugs for treatment, infection duration, and medical management in cases of resistance
	17	Al-Maniri et al., 2008, Oman	To evaluate suspicion of tuberculosis by GPs in units of public and private health	Questionnaire related to five clinical cases	Cross-sectional	Does not apply	257	The general index of suspicion was only 37.7% of GPs and public hospitals had a better degree of suspicion compared to private units (27.3 *versus* 53.4%, p = 0.001)
	18	Hong et al.,1995, South Korea	Knowledge, attitudes and practices of GPs	Responses to questionnaire	Cross-sectional	Does not apply	923	More than 50% do not consider the sputum examination essential for diagnosis, and 75% to monitor response to treatment. For initial treatment of active tuberculosis, only 11% prescribed in accordance with government guidelines. More than 73% were using treatment regimens that are not recommended and 16% unacceptable regimes
	19	Singla et al., 1998, India	Knowledge, attitudes and practices of doctors in the private system	Responses to questionnaire	Cross-sectional	Does not apply	204	In suspected cases of tuberculosis only 22 (12%) of GPs requesting sputum AFB smear[6] for diagnosis. Only 66 (18%) search contacts, and 39 (19.5%) guide the patient to regular treatment

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TABLE 1 Synopsis of the articles relating to acute respiratory tract infections (ARI), tuberculosis, asthma, COPD, and asthma and COPD in conjunction (continuation)

Asthma	20	Marklund et al., 1999, Sweden	To estimate the frequency of diagnostic errors in asthma by GPs	Review by allergy specialist, spirometry and bronchial challenge test whenever there is diagnostic uncertainty	Cross-sectional	123; >18 years; no reports	6	One hundred and twenty three patients completed the inclusion criteria and were invited for further consultation. Eighty six of these (70%) accepted the invitation. At the end, 51/86 (59%) had asthma, six (7%) had asthma combined with COPD, and 29 (34%) had no asthma
	21	Montnémery et al., 2002, Sweden	Assess whether the low prevalence of asthma was caused by underdiagnosis in primary care. The study also assessed the validity of the first diagnosis of asthma by GPs in primary care	Evaluated by pulmonary specialists	Cross-sectional	3,025; ≥18 years; no reports	100	99 patients were diagnosed with asthma and were reevaluated by pulmonologists. The diagnosis of asthma was validated on 52 cases (76.5%), with a sensitivity of 0.59 (95% CI 0.31-0.81) and specificity of 0.99 (95% CI-0.99-1.00). These results indicated that 23.5% of patients were diagnosed as asthmatic by GPs without actually having the disease
	9	Adams et al., 2003, Australia	To compare the clinical diagnosis of asthma by GPs with spirometry	Spirometry	Cross-sectional	3,422; ≥18 years; no reports	Not informed	Of the 3,422 individuals interviewed, 2,523 (74%) agreed to participate in the clinical assessment, and 292 (11.6%) had asthma according to spirometric criteria. Of this total, 236 (9.3%) had a previous, self-reported, diagnosis of asthma, and 56 (2.3%) were unaware of the diagnosis and were defined as having asthma according to spirometric criteria. Thus, the group diagnosed with asthma by spirometry, 56 (19.2%) had no previous diagnosis of asthma
	10	Hahn et al., 1994, United States	Describe the epidemiology of diagnosis, and the possible underdiagnosis of asthma	Responses to questionnaire	Cross-sectional	14,127; All age groups; 15	59	Of the total sample, 13,542 (95.5%) answered the questionnaire properly. Of this total, 10.3% reported having previous medical diagnosis of asthma. The study revealed that 6.5% of patients who had wheezing had no previous diagnosis of asthma (underdiagnosis)

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TABLE 1 Synopsis of the articles relating to acute respiratory tract infections (ARI), tuberculosis, asthma, COPD, and asthma and COPD in conjunction (continuation)

Asthma	22	Ward et al., 2004, United Kingdom	Assessed the under- and overdiagnosis of asthma in patients aged 16-55 years in primary care	Analysis of questionnaire answered by the patients themselves	Cross-sectional	833 patients and 831 controls; 16-55; 34.3 average	8	The response rate was 79.1% (659/833). Among the respondents, 60.5% (399/659) had symptoms of bronchial hyperactivity; among those without bronchial hyperactivity, 73.1% (190/260) were considered asthmatic according to a review of their medical records. The authors concluded that there is a chance of 89.4% that patients with this diagnosis reported in their medical records do in fact have asthma
COPD	23	Bednarek et al., 2008, Poland	To investigate the prevalence and severity of COPD in primary units	Responses to a questionnaire and spirometry	Cross-sectional	2,250; 40-93; 56.7	2	Out of the 183 (9.3% of total) patients diagnosed with COPD based on responses to a questionnaire and spirometry, only 34 (18.6%) had a previous diagnosis
	24	Geijer et al., 2005, Netherlands	To determine the prevalence of underdiagnosis of airflow obstruction according to the GOLD criteria[7]	Responses to a questionnaire and spirometry	Cross-sectional	3,985; 40- 65; 50	Not informed	Among the 702 who responded and possessed an acceptable and reproducible spirometry, 201 (29.9%) had an obstructive pattern not previously detected
	26	Roberts et al., 2009, United Kingdom	To define the predictive value of clinical diagnosis or suspicion of COPD in primary care patients presenting spirometric criteria for diagnosis according to GOLD[7]	Spirometry	Cross-sectional	677; Not defined; 63.8	Not informed	Of the 503 who had clinical diagnosis and were referred for evaluation of disease severity, 141 (28%) patients presented normal spirometry. The remaining 302/503 (60%) had obstruction of air flow and possible COPD according to the GOLD criteria,[7] stage 2. The positive predictive value of the diagnosis of COPD in primary care was 0.62 for patients referred for severity assessment and 0.56 for patients referred for diagnostic testing
	27	Zwar et al., 2011, Australia	Comparison of the clinical diagnosis of COPD in primary care GPs with spirometry	Spirometry	Cross-sectional	1,144; 40-80; 65	56	Of the 1,144 patients identified, 445 (38.9%) agreed to participate, undergoing spirometry. Of these, 257 (57.8%) had spirometry consistent with COPD; i.e., in this study, there was about 40% overdiagnosis and many patients were treated unnecessarily

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TABLE 1 Synopsis of the articles relating to acute respiratory tract infections (ARI), tuberculosis, asthma, COPD, and asthma and COPD in conjunction (continuation)

COPD	28	Walters et al., 2011, Australia	To evaluate the diagnostic errors of COPD in primary units	Spirometry	Cross-sectional	1,200; Not informed; 65	31	Of the 1,200 patients identified, 341 (58%) underwent spirometry and 234 (69%) had a confirmed diagnosis. In 31% of cases, diagnostic errors were found
	29	Hamers et al., 2006, Brazil	To assess the competence of GPs in primary care regarding the diagnosis of COPD	Spirometry	Cross-sectional	350; ≥ 15 years; 46.8	34	Of the 142 (44.9%) patients who underwent spirometry, 94 (66%) had been correctly diagnosed by the GPs (Kappa = 0:55), nine with confirmed COPD and 85 without COPD. The remaining 48 (34%) were discordant: 27 had COPD according to the spirometry and were not diagnosed by the GPs, and 21 were false positives
	30	Joo et al., 2011, United States	To examine the characteristics associated with the use of spirometry in primary care with increased risk for COPD and to determine the diagnostic accuracy of spirometry in patients with COPD	Spirometry	Cohort	1,052;≥ 35;57	Not informed	A total of 1,052 patients were identified and 527 (50%) had spirometry. Of the 159 patients identified as COPD, 93 (58.5%) met the GOLD criteria.[7] Of the 362 without a diagnosis of COPD, 93 (25.7%) had COPD according to the same criteria. It was also found that chronic cough or dyspnea were more associated with a request for spirometry than current or previous smoking habits
	31	Hill et al., 2010, Canada	To measure the prevalence of COPD in patients aged over 40 years with a smoking history	Spirometry and clinical assessment	Cross-sectional	1,459; ≥40; 60	Not informed	Of the 1,459 eligible patients, 1,003 underwent spirometry and completed a questionnaire. Of these, 208 (20.7%) had spirometric criteria for COPD according to GOLD[7] 2, FEV1/FVC<0.70[8,9] and FEV1<0.80).[8] Only 67 (32.7%) had a previous diagnosis of COPD
Asthma and COPD	32	Pearson et al., 2003, United Kingdom	To assess the impact of spirometry and clinical evaluation in the diagnosis of airway diseases	Spirometry and questionnaire applied by the nursing staff	Cross-sectional	61,191; ≥40; 66.7	1,003	The evaluation showed improper base diagnosis with change in 54% of diagnoses of asthma, COPD in 14% and 63% for other conditions

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TABLE 1 Synopsis of the articles relating to acute respiratory tract infections (ARI), tuberculosis, asthma, COPD, and asthma and COPD in conjunction (continuation)

	33	Melbye et al., 2011, Norway	To describe symptoms and lung function in patients diagnosed with asthma or COPD in primary care and to describe how the results of spirometry fit the diagnoses made by GPs	Spirometry	Cross-sectional	367; ≥40; 62	Not informed	The diagnosis of COPD was confirmed by spirometry and according to GOLD[7] criteria in 68.1% of patients, while the diagnosis of asthma was confirmed in 17.1%. The kappa agreement between the diagnosis of COPD in the medical record with the spirometric diagnosis was 0.50. Spirometry helped confirm that patients had a mixed disease but did not discriminate between asthma and COPD in all cases
	34	Izquierdo et al., 2010, Spain	Goal was to analyze the diagnostic accuracy in patients receiving inhaled medications in primary care	Spirometry	Cross-sectional	9,931; ≥18; 58.3	1,449	4,188 (42.9%) had a diagnosis of asthma, 4,175 (42.8%) had a diagnosis of COPD, and 1,389 had non-identifiable diagnoses. Among patients aged over 40 years with diagnoses of COPD and spirometry (50.9%), only 13.9% met the GOLD criteria[7]
	35	Weidinger et al., 2009, Sweden	To assess adherence to guidelines in primary care in patients with asthma and COPD	Swedish national guidelines for asthma and COPD	Cross-sectional	623; All age groups; not informed	Not informed	Adhesion was found in 130/499 (26%) of patients with initial diagnosis of asthma and 35/124 (28%) of patients with initial diagnosis of COPD
Asthma and COPD	36	Raghunath et al., 2006, United Kingdom	To assess differences in the interpretation of spirometry and peak expiratory flow (PEF) between primary care GPs and pulmonary specialists in patients with a previous diagnosis of asthma or COPD	Pulmonologists	Cohort	102; ≥45 years; not informed	Not informed	The concordance between the diagnoses of generalists and specialists (Kappa) in the evaluation of tests was 0.20

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TABLE 1 Synopsis of the articles relating to acute respiratory tract infections (ARI), tuberculosis, asthma, COPD, and asthma and COPD in conjunction (continuation)

	37	Starren et al., 2012, United Kingdom	To check the operation of a unit of reference for respiratory conditions by reviewing the diagnoses of referrals from GPs	Pulmonologists	Cross-sectional	1,156; All age groups; 61.3	28	Of the 1,156 patients referred, COPD was the most common cause (445/666; 66.8%); over one third of the diagnoses suggested by GPs were incorrect (161/445; 36%)
	38	Lucas et al., 2012, Netherlands	To assess what criteria GPs use to justify their diagnostic hypothesis of asthma and COPD; whether the evaluations by experts cause changes in diagnoses of GPs; and whether to make GPs justify their diagnostic hypotheses, influences the diagnosis given in the reference center	Pulmonologists	Cross-sectional	284; 2-88; 51	17	Only 50% of diagnostic hypotheses were confirmed by the specialized service. The chances of asthma were confirmed more frequently (62%) than those of COPD (40%). The justifications for the diagnostic hypotheses of GPs did not influence the results
Asthma and COPD	39	Broekhuizen et al., 2010, Netherlands	To determine the frequency of asthma or COPD in people aged over 50 years who consult their GPs because of persistent cough	Panel with an experienced GP and a pulmonary specialist	Cross-sectional	353; ≥50; 63	73	After evaluation of pulmonary function tests and discussion of clinical data by a panel of two doctors, it was concluded that 29% of patients had a diagnosis of COPD, 7% had asthma, and 4% were diagnosed with mixed disease. It should be reiterated that these diagnoses were new, that is, they were not previous diagnoses made by assistant GPs

[1]Ref - Reference, [2]CRP - C-reactive Protein, [3]ROC - receiver operating characteristics curve, [4]ESR - Erythrocyte sedimentation rate, [5]PCT - Procalcitonin [6]AFB - Acid-fast bacilli, [7]GOLD -Global Initiative for Lung Chronic Obstructive, [8]FEV1 Forced expiratory volume in 1 second, [9]FVC- Forced vital capacity.

Pulmonary tuberculosis

Few studies about tuberculosis that fulfilled the inclusion criteria were encountered (Table 1). Only one reported the degree of suspicion of diagnosis or knowledge on the part of general practitioners and specialists, though this was not the main focus of the article and not directly assessed,[16] while the other studies only assessed the knowledge or degree of suspicion of tuberculosis by general practitioners.[17-19]

Asthma

In the case of asthma, only two studies evaluated the diagnostic ability of general practitioners through a follow up evaluation by experts (Table 1). [20,21]

The first, conducted in Sweden in 1994 included patients aged over 18 years visiting general practitioners in selected PHC, verifying the frequency of errors in relation to asthma diagnosis by general practitioners. The patients with this diagnosis established in the medical records were invited to be examined by allergists. The diagnoses were discussed by a group that included a general practitioner and a nurse, in addition to the allergist. One hundred and twenty-three patients fulfilled the inclusion criteria and were invited to another consultation. 86 of these (70%) accepted the invitation. At the end, 51/86 (59%) had their asthma diagnosis confirmed, six (7%) were diagnosed with an asthma-COPD association and 29 (34%) did not have asthma, i.e. they were initially wrongly diagnosed.[20]

The second, also conducted in Sweden, investigated whether the low level of asthma diagnoses was due to underdiagnosis in PHC, as well as assessing the validity of the first asthma diagnosis by general practitioners. Over the course of three months in 1997, all patients seeking medical assistance at PHC units in the district of Lund with upper or lower respiratory tract infections, prolonged cough, allergic rhinitis, dyspnea or a first positive diagnosis of asthma were recorded (n=3,025). Ninety-nine were diagnosed with asthma and reassessed by pulmonologists. The results indicated that 23.5% of patients were mistakenly considered as asthmatic by general practitioners.[21]

Three other articles were evaluated: one assessed the concordance between the clinical diagnosis of asthma undertaken previously by the general practitioner with the spirometry results;[9] the other two assessed the underdiagnosis of asthma and used an non-validated questionnaire as a diagnostic tool, without specialized clinical assessment or spirometry.[10,22]

In the five studies selected, overdiagnosis varied from 10.6[22] to 34%[20] and underdiagnosis from 6.5[10] to 19.2%.[9]

COPD

Studies whose main focus was to assess the concordance between the diagnosis by PHC physicians and specialists were not encountered. The selected studies, which compared the diagnosis by general practitioners and spirometry results revealed mistakes in the diagnosis, characterized by both under and overdiagnosis.

In the eight studies selected[23-31] overdiagnosis varied from 28[26] to 40%[23] while underdiagnosis, from 25.7[30] to 81.4%.[23]

A study conducted in Brazil assessed the concordance between the diagnosis by PHC general practitioners and spirometry according to the criteria established by the GOLD initiative. 94 (66%) of the 142 (44.9%) of patients undergoing spirometry had concordant diagnoses with that of the general practitioners (Kappa = 0.55), with 9 having a confirmed diagnoses and 85 without COPD. The remainder (48; 34%) was discordant: 27 had COPD according to the spirometry and were not diagnosed by the general practitioners, and 21 were false positives. In this study, the variables associated with the spirometric diagnosis of COPD were: being male, having a rural origin, the presence of dyspnea and cough, being a current smoker, being over 55 years, and exposure to smoke from wood stoves. [29]

Asthma and COPD

The studies encountered that evaluated asthma and COPD in conjunction are heterogeneous in relation to the methodologies employed. In the eight studies recovered,[32-39] the variation in the overdiagnosis of COPD was 36[37] to 86.1%,[34] while for asthma this was 38[38] to 74%.[35] The variation in the underdiagnosis of COPD was 14[32] to 29%,[39] while for asthma this was 7[39] to 54%.[32] The majority used an evaluation of the database followed by reassessment of patients, with the exception of one study based on the patient's symptoms at a spontaneous visit to a primary care unit.[39]

For example, the Cadre study (*COPD and Asthma Diagnostic/management Reassessment*), conducted in the United Kingdom involved more than a thousand GPs and included over 60 thousand patients who had been treated for a respiratory condition and were reassessed using a standardized questionnaire applied by nurses, as well as spirometry. An experienced GP then evaluated the questionnaire, spirometry results and made the diagnosis. This new assessment showed incorrect diagnosis, with a 54%

increase in the diagnosis of asthma, 14% increase in COPD and 63% increase in other diseases.[32]

Broekhuizen et al.[39] assessed patients aged over 50 with persistent cough lasting more than 14 days without a previous diagnosis of asthma or COPD. After evaluating the lung function tests and discussing the clinical data in a panel formed by two physicians, it was concluded that 29% of patients had a diagnosis of COPD, 7% had asthma and 4% an overlapping condition. It should be reiterated that these diagnoses were new, that is, there was no previous diagnosis made by assistant general practitioners (Table 1).[39]

Discussion

This comprehensive literature review found that despite the methodological heterogeneity of the studies encountered, the accuracy of acute and chronic respiratory disease diagnoses elaborated by general practitioners in primary health care is low.

Even those approaching the conditions separately presented different methodological delineations and aspects, which hindered the interpretation and elaboration of definitive conclusions. As an example, the imprecision of the asthma diagnosis varied from 54% underdiagnosis to 34% overdiagnosis,[32,20] while for COPD there was 81% underdiagnosis up to 86.1% overdiagnosis.[23,34] This heterogeneity may have occurred, at least in part, because the studies were not randomized, due to the diversification in sampling and definitions of each disease, and the variables considered in the populations analyzed.

In relation to ARI, the use of auxiliary diagnostic exams almost always resulted in improved diagnostic accuracy and consequent decrease in the prescription of antibiotics.[12,14]

In relation to tuberculosis, the better results from specialists over those from general practitioners in primary care seem obvious and natural, but as it is a condition of interest to national and international public health, a better performance was expected from general practitioners.[16] The studies encountered prove the low level of knowledge about tuberculosis by general practitioners working in primary care.[18,19]

Underdiagnosis and thus under-treatment may present a significant impact on the increased morbidity and mortality of respiratory diseases.[40,41] Similarly, overdiagnosis may lead to increased costs and possible collateral effects related to unnecessary treatment.

The literature reviewed places the general practitioner as the key player in the context of mistaken diagnosis, whether through lack or excess. In both cases, the degree of liability of accidents for the mistakes cannot be determined. It is also difficult to determine on what proportion it can be defined as systematic errors relating to difficulties accessing exams, or cognitive errors by general practitioners - errors owing to interpretation of signs and symptoms when the patient presents them. In other words, some authors interrogate if under diagnosis is due to the inappropriate interpretation of symptoms by the physician or the patients' failure to express their symptoms to the doctor.[42-45]

Another point to consider is that the slow and progressive nature of diseases such as asthma and COPD seems to lead to a decreased perception of their manifestations. Cough and reduced tolerance to exercise may be seen as normal phenomena in certain age ranges. As a result, patients do not seek general practitioners and in an eventual appointment may fail to report such symptoms to their physician.[46]

For around 50 years it was thought impossible for blood pressure to be measure by nurses or nursing technicians. Nowadays the importance of these professionals in official blood pressure control programs is recognized. Thus, a multi-professional strategy in the detection of high prevalence diseases should be implemented as opposed to focusing solely on experts, a common approach at present.[46] For example, the incorporation of simple questions in the routine of health professionals, such as "Do you smoke? Do you want to stop smoking?", as part of a program could significantly increase the diagnosis of COPD and the effectiveness of programs for smoking cessation.

The common sense that the context of PHC is less complex than those with medium to high complexity seems incorrect. PHC has the most extensive clinical practice and is where interventions of high complexity should be undertaken, such as those relating to changes in behavior and lifestyles in relation to health, including stopping smoking, adopting healthy eating behaviors and physical activity, among others. The secondary and tertiary levels of care include practices with higher technological density, but not necessarily higher complexity. This distorted view of complexity, whether singular or systematic, leads politicians, managers, health professionals and the population as a whole, to overvalue the practices that are carried out at the secondary and tertiary levels of health care and, consequently, to a trivialization of PHC.[47]

In the cases of the most prevalent diseases and those of major interest in the management of public health, it is expected that PHC physicians should obtain high detection rates, or at least higher levels of sensitivity, considering the fact that they provide front line medical atten-

tion, where the lack of a medical diagnosis will result in increased morbidity or the occurrence of acute and chronic complications. Specialists have a supporting role in the diagnosis and monitoring of the more complex cases. The detection process should be primarily the responsibility of primary care, which presupposes adequate training of GPs and the implementation of a horizontal care program including the provision of medication and supplementary exams to diagnostics so that respiratory diseases can be identified and treated at an early stage.

This review includes some limitations which should be discussed. Some studies about ARI only compared prescriptions for antibiotics and did not verify the quality and accuracy of the diagnosis.[11,12,14] Other works assessed accuracy as a secondary outcome.[15] Methodological differences within the same group may have compromised these results, at least in part. Various differences can be highlighted, since the stage of inclusion criteria: database or spontaneous demand reviews, age, history of smoking, through to definition of the COPD diagnosis, with some using the GOLD 1 (FEV1/FVC <70) criteria , others GOLD 2 (FEV1/FVC <70 and FEV1 <80%), while in others the criteria were not clearly defined. Another limitation that can be cited is the extraction of data by a single researcher, which may have affected the reproducibility of the results.

Conclusion

The results prove, in a general manner, that there are diagnostic errors and that the level of knowledge of respiratory diseases by general practitioners in various countries is lower than desired. To better understand the reality of healthcare in PHC, further studies with methodologies better defined regarding inclusion criteria and assessment tools, should be conducted. Their results could support the adoption of consistent policies for improving healthcare as a whole.

Resumo

Precisão diagnóstica de doenças respiratórias em unidades primárias de saúde.

As doenças respiratórias acometem 15% da população do planeta e respondem por 1/5 dos óbitos no mundo. Espera-se que a atenção primária à saúde (APS), primeira instância da assistência médica, solucione até 85% dos problemas de saúde em geral. Pouco se sabe a respeito da habilidade de médicos generalistas da APS em relação ao diagnóstico das doenças respiratórias. Esta revisão refere-se à habilidade diagnóstica de médicos generalistas que atuam na APS em relação às doenças respiratórias mais prevalentes, como doenças respiratórias agudas (IRA), tuberculose, asma e doença pulmonar obstrutiva crônica (DPOC). Dentre 3.913 artigos, 30 foram selecionados após aplicação dos critérios de inclusão e exclusão. Ficou demonstrada a carência de dados consistentes sobre a acurácia dos diagnósticos de doenças respiratórias elaborados por generalistas. Em relação à asma e à DPOC, os estudos demonstram erros diagnósticos que levam ao sobrediagnóstico ou ao subdiagnóstico, dependendo da metodologia usada. A imprecisão do diagnóstico de asma variou de 54% de subdiagnóstico a 34% de sobrediagnóstico; para DPOC, houve variação de 81% de subdiagnóstico a 86,1% de sobrediagnóstico; para IRA, verificou-se que a inclusão de exame complementar de auxílio diagnóstico melhora sua acurácia. Os estudos demonstram um baixo nível de conhecimento sobre tuberculose por parte dos generalistas. De acordo com esta revisão, a APS, na figura do médico generalista, necessita aprimorar sua capacidade de diagnóstico e o manejo desse grupo de pacientes, que constitui uma de suas principais demandas.

Palavras-chave: doenças respiratórias; atenção primária à saúde; diagnóstico; médicos de atenção primária; revisão.

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