



EUROPEAN RESPIRATORY UPDATE

Practical approach to lung health: lung health for everyone?

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The World Health Organization (WHO) estimates that approximately 50% of people with tuberculosis (TB) are never diagnosed as having the disease and so cannot benefit from treatment, leaving the epidemic unchecked despite increasing global coverage by treatment programmes [1, 2]. Improved passive case detection is fundamental to the control of the TB epidemic and depends on alert clinicians identifying TB in patients seeking primary care for respiratory symptoms [3]. Poor TB case detection is also linked to substandard local health facilities, which, owing to their perceived lack of quality, are shunned by people who need diagnosis and treatment [2]. Even in Europe, TB continues to pose a public-health threat with inappropriate care, particularly in multidrug-resistant disease [4].

Chronic respiratory disorders, particularly asthma and chronic obstructive pulmonary disease (COPD), have attracted limited special attention in low- and middle-income countries [2]. Primary healthcare (PHC) facilities, while geared to identify patients that might have TB, are often poorly resourced for making other respiratory diagnoses or for treating even pneumonia [5]. In many developing countries, programmes for the management of respiratory diseases are poorly developed or limited, and the quality of care offered is often of a low standard [6]. Common problems are underdiagnosis and misdiagnosis leading to inappropriate reliance upon antibiotics and underuse of inhaled corticosteroids in asthma as many national managers in the Ministry of Health consider the unit cost of inhaled corticosteroids too high, and favour oral treatment [6]. Accessibility to care and availability of essential drugs remain important obstacles to improving care in many countries.

In an effort to remedy this challenging situation, the Stop TB Department of WHO has inaugurated several initiatives to improve global TB control, among those is PAL (Practical Approach to Lung Health), which has the following specific goals. 1) To improve the quality of management of patients with respiratory symptoms in the setting of PHC. 2) To improve the efficiency of the delivery of respiratory services within the overall health system, with a focus on coordination and integration of respiratory case management within the

district health system of low- and middle-income countries, particularly those with already successful TB control programmes or a high prevalence of HIV infection [2].

PAL was initiated in light of the progress made in the Integrated Management of Childhood Illness (IMCI) strategy, as there were no clearly formulated instructions on how to manage patients aged >5 yrs with respiratory symptoms. PAL is aimed at improving the management of major respiratory disorders, and in the process increases the identification of TB patients among all those with compatible symptoms who seek care in PHC settings [7, 8]. Moreover, by increasing the clinical efficiency and quality of services rendered by primary care facilities, they should become more patient receptive and attract sufferers who previously avoided them [2, 7–10]. In 2009, PAL was recognised for its contribution to the strengthening of health systems and, thus, became a sub-component of the new Stop TB Strategy [11].

In brief, PAL is intended to improve the quality of care in patients who seek assistance for respiratory symptoms in PHC settings and the efficiency of respiratory service delivery within health systems, with a focus on the district health system. We conducted this review aiming to enhance PAL visibility, highlighting its objectives and reporting evidence obtained from the experience on clinical, managerial and economic impacts of PAL implementation from several countries.

METHODS

To identify relevant studies, we conducted a systematic literature search in the bibliographic databases MEDLINE and Google Scholar from January to April 2012, using “Practical Approach to Lung Health” as the keyword. This search was also performed in the WHO document archive. In addition, a non-systematic review of the relevant evidence for the development and implementation of guidelines for respiratory diseases in PHC, as well as results of the IMCI strategy, was performed in the same database. Results were completed by personally collected data on PAL programmes from one author (S. Ottmani) that included national guidelines, country reports, scientific publications and personal communications.

This review will start with a description of the PAL strategy, detailing the reasons that led to its formation, as well as its purpose and main components (*i.e.* guidelines and training of healthcare workers). The second part of the review will discuss the observed outcomes of PAL in view of what was expected regarding management of respiratory infections, quality of care

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of chronic respiratory patients, diagnosis and treatment of TB patients, and impact on drug costs.

EPIDEMIOLOGICAL JUSTIFICATION OF PAL: RESPIRATORY BURDEN ON PHC

Lung disease is one of the leading causes of death in developing countries. Lower respiratory infection, TB, COPD and asthma amount to 15.4% of all disability-adjusted life years lost in South East Asia [12].

Respiratory conditions affect a vast amount of patients worldwide. Among the adults and children aged >5 yrs who attend PHC facilities, 20–30% seek care for respiratory symptoms [3, 13–15]. Thus, PAL should provide services to a substantial proportion of outpatients seeking healthcare [2].

Over 80–90% of respiratory patients suffer from acute respiratory infections, with a majority suffering from upper respiratory infections [14–17]. Among these respiratory infections, pneumonia is usually infrequent (<1–2%). Chronic respiratory diseases accounts for 10–15% of respiratory patients [13, 14, 17].

However common they are, respiratory diseases pose major health problems, especially in rural areas where proper facilities and well-trained health staff are lacking [3, 12]. Mountainous terrain, dispersion of inhabitants on numerous islands and travel difficulties may affect patterns of care seeking, with acutely ill patients more likely to make the journey, compared with mild or chronic patients. A high proportion of patients presenting to a PHC in Lesotho with routine respiratory complaints had serious respiratory illnesses: pneumonia accounted for 10% of all diagnoses, confirmed or probable TB accounted for 13%, and chronic respiratory conditions accounted for 14% of all diagnoses [18]. Moreover, among respiratory patients, asthma is undertreated, antibiotics are overprescribed and TB is underdiagnosed [3, 16]. If patients presenting with routine respiratory complaints at primary health facilities have serious respiratory illnesses, outcomes for such patients are unlikely to improve unless PHC facilities receive significant upgrades in diagnostic and therapeutic ability [18].

PAL ELABORATION

The horizontal integrated multi-problem approach contrasts with vertical health programmes which are attacking one or a few health problems, little attention is paid to horizontal programmes that favour medium- to long-term service strengthening and sustainability. However, frontline multi-purpose health workers have to ensure that Millennium Development Goals for priority diseases will be met [6]. The PAL strategy is a patient-centred syndromic approach to diagnosis and treatment of respiratory conditions with a focus on PHC. It promotes a symptom-based and integrated management. It aims at improving the identification and management of TB with respect to the other respiratory illnesses, as well as the identification and management of non-tuberculous respiratory conditions with respect to TB. It also aims to improve coordination between the different components and programmes of the health system, including the National TB Programme, as many components are involved in the management of patients with respiratory symptoms [2, 16, 19]. PAL is a minimum package of care provisions,

which should be offered to any respiratory patient in the PHC setting [2, 7–10].

Recommendations are designed to improve the onsite management of the patients, and to decrease the need of referral. In the same way, drug prescription is limited to essential drugs, with standardised prescription methods to avoid useless or inappropriate treatment [12]. Training on integrated processes of management should improve healthcare workers' skills in an appropriate way.

The PAL strategy includes two components: 1) standardisation of clinical care through the adaptation and development of clinical practice guidelines; and 2) coordination based on the collaboration among health workers at the same and different levels of the health system, as well as within and among the various categories of health workers. The role of each health worker category and each healthcare level must be clearly defined. This contributes to establishing an efficient referral system [2, 9, 11].

PAL implementation follows 10 standardised steps: 1) enlist the national working group (NWG) who will support the PAL strategy; 2) estimate the burden of respiratory diseases; 3) assess the capabilities of the health infrastructure in implementing the PAL strategy; 4) develop clinical guidelines; 5) design communication messages; 6) formulate an information system to monitor and evaluate the implementation; 7) develop training materials; 8) test the implementation of the clinical guidelines and the information system in a pilot area; 9) develop a national implementation plan; and 10) organise systematic supervision and evaluation of the PAL strategy [9, 11, 12]. It should be noted that feasibility testing is no longer required as PAL has been successfully tested in numerous countries.

PAL implementation requires a clearly identified coordination unit, ideally within the National TB Programme or PHC Department [2, 9]. Political commitment must be continuous and the health information system of the country must be used to provide monitoring and evaluation of PAL activities [11].

The Kyrgyzstan experience shows that the PAL strategy can be introduced into a PHC system if the government states its political commitment and secures budgetary support [20]. In 30 months they were able to accomplish the essential steps to adapt the guidelines, develop the managerial instruments, test the feasibility and start nationwide expansion [20]. A plan to expand the strategy to all the PHC services was prepared and approved by the El Salvador Ministry of health [21].

GUIDELINES

The interventions aiming to transfer knowledge and technology need to be adapted and contextualised to local settings, and evaluated to determine the potential health effects in relation to cost [12].

At the PHC level, respiratory patients are managed on the basis of their symptoms, but this is not carried out in a systematic and standardised manner [11]. Throughout the world, clinical guideline implementation in primary care is poor. This may be explained, at least in part, by patients presenting with undifferentiated symptoms and no ready-made diagnosis [22]. The need for guidelines adapted for primary care is obvious, even in developed countries. Implementation of specific guidelines

drastically improved the management of respiratory paediatric patients, not only in developed countries but also in developing countries [22]. Diagnosis of the patient with chronic respiratory disease in the primary care setting requires a symptom-based approach and knowledge of the diseases presenting in the patient population [23, 24]. The PAL approach provides a framework for both diagnosis and management within the limitations of local resources, but in order to be relevant and effective it needs to be adapted to local conditions dealing with respiratory conditions encountered and formatted according to how services are structured [2, 6, 25]. Guidelines must be homemade, *i.e.* written by a national group, in accordance with local needs and recommendations. They are designed to improve the case management of respiratory diseases at PHC outpatient services and first referral hospitals. Guidelines should take into account country context, health policy and existing national guidelines. They have also to be evidence based.

Healthcare providers use the guidelines to perform step-by-step patient evaluations, in order to determine the specification of the most suitable form of disease management. Using key symptoms and signs leads to the diagnostic classification, the determination of degree of severity and the appropriate management decision. The guidelines identify syndromes using symptoms and signs that best predict each disease. Main respiratory symptoms usually considered in the guidelines consist of cough, shortness of breath and chest pain. Fever is an important additional symptom, as well as expectoration, nasal discharge and sore throat, which are all frequently reported [13, 17]. The elaboration of PAL guidelines in South Africa (PALSA) is one reference, but the work has been performed in a similar way in other countries [2, 9, 11]. The NWG that developed the guidelines comprised of respiratory specialists, primary care practitioners, a pharmacist and health systems researchers [19]. The targeted users, which included nurses, primary care doctors, health department managers and local experts, all elicited their practices, needs and views on the guideline [5]. Individual and combinations of symptoms and signs that best predicted each respiratory condition or syndrome were determined by reviewing the literature [19]. TB was considered at several decision points. National policies and essential drugs lists were adhered to [19]. Locally identified barriers to care were taken into account [5]. Common respiratory conditions encountered in South African adults were addressed and included TB, TB/HIV co-infection, upper and lower respiratory tract infections including pneumonia, and obstructive lung diseases [3].

Recommendation accuracy is a real concern, as high-quality randomised controlled trials are often based on highly selected patients not representing the population of patients seen in day-to-day practice [26]. Some deviations from the identified evidence-based recommendations, due to lack of diagnostic equipment or insufficient skills, imply changes in management [5]. However, basic recommendations should be applicable in every setting if the benefit is important for the patient. Human and material possibilities should be used at best, and some modifications of the essential drug list, if necessary, proposed. PAL recommendations should also be adapted for confusing co-existing diseases. However, in countries with high malaria prevalence, malaria rapid diagnostic testing should be integrated in PAL algorithms (*e.g.* the Solomon Islands guidelines).

In a Nigerian study, of the 23% of children that met the criteria for both malaria and pneumonia, only half of them had a positive test result and required malaria treatment [27].

The guideline should undergo external review [5] and continual revision [6]. In Kyrgyzstan, PAL guidelines were revised after analysis of the results of the feasibility test, the comments made by the clinical experts and the feedback received from the trained doctors [20].

TRAINING HEALTH WORKERS TO STRENGTHEN HEALTH SYSTEMS

Health system organisation should determine the type of recommendation depending on the health workers' skills at initial and referral level [12]. In North African countries, general practitioners (GPs) work in PHC centres and were targeted by PAL, whereas in countries with reduced medical staff, nurses and technical officers assume PHC. They are required to make the initial assessment and provide treatment [5] as in rural areas a referral to see a doctor may be delayed by weeks [5]. In this case, PAL strategy for PHC centres is specifically designed for healthcare providers with limited healthcare training (*e.g.* in the Solomon Islands) [3, 19, 28]. Therefore, PAL focuses on enabling primary care practitioners, GPs and nurses to function efficiently as frontline clinicians [19]. PALSA expanded prescribing provisions for nurse practitioners to include inhaled corticosteroids for asthma, short-course oral corticosteroids for exacerbations of obstructive lung disease, and cotrimoxazole prophylaxis for symptomatic HIV infection [3]. Training on smoking cessation support is essential but requires specific training courses. In the same way, training on chest radiography interpretation is a frequent request of the GPs.

The goal of ensuring equitable access to quality healthcare is further hindered by the difficulty of retaining staff in rural areas of low- and middle-income countries; Malawi in particular has a vacancy rate of 50% [29]. Training healthcare workers all over the country is then mandatory to maintain a sustained PAL activity. Moreover, projects like PALM PLUS are designed to support mid-level healthcare workers in improving their job satisfaction, therefore, improving their retention in rural health centres [29]. Strengthening health resources suggests that some additional resources are needed to improve working conditions [30].

Training modalities

Improving health worker performance is critical for strengthening health systems [31], and training constitutes an essential step of PAL implementation. The DOTS Expansion Working Group considers the lack of trained staff as the most important constraint on TB control [32]. However, as a multi-country survey concluded about IMCI, more attention should be paid to skill building rather than knowledge accumulation [33].

In South Africa, between two and six educational outreach sessions were delivered to nurse practitioners by usual trainers from the health department. The emphasis was on key messages drawn from the guideline, with illustrative support materials [3]. South African results show that in countries where non-physicians provide primary care, equipping middle managers as outreach trainers is feasible within existing constraints on staff, and could improve quality of care [3].

The guidelines are completed by training material that should be similarly reviewed and updated. Training material should be developed by the NWG and should target the implementation and the appropriate utilisation of PAL guidelines by health workers in their daily tasks [2, 9]. PALS training materials included customised messages that were incorporated into illustrated support materials [34]. Documents on how to use, clean and maintain equipment such as peak flow meters, inhalation chambers, nebulisers, spirometry and oxygen supply should be provided [2, 9], together with demonstration devices [34].

Perceived barriers to successful acceptance of new knowledge in primary care have ranged from lack of confidence in the subject, information overload and professional isolation [34]. A training approach that makes healthcare practitioners reflect on their existing knowledge and skills, and is based on interactive learning would probably improve onsite teaching [34]. Preliminary feedback of PALS training showed an increase in trainers' self-awareness and self-confidence [34]. The educational outreach intervention in South Africa was sustainable, reaching thousands of health workers and hundreds of clinics since the trial [35]. The success of the PALS guidelines was evidenced by the very favourable response from users and managers [5]. Even before the study results were analysed, requests were received from both provincial and the national Departments of Health who required an expansion of the guideline content for the follow-up of patients on anti-retroviral therapy [5].

The ultimate state of PAL implementation is represented by its integration in students' programmes, either in medicine or in nursing schools. The Kyrgyzstan State Medical Academy included the teaching of the PAL and TB control guidelines in the pre-graduate training curricula [20]. 36 university teachers were trained in the use of PAL guidelines for PHC [20].

EQUIPMENT

Guideline recommendations should be in accordance with available equipment. The equipment list suggested in the WHO PAL manual (table 1) [8] is modified according to existing possibilities (*i.e.* power supply, oxygen transport, *etc.*), health worker skills and budget availability. However, the necessity of improving quality of care should be kept in mind, upgrading PHC and first referral unit equipment. In the Solomon Islands, a low-income country with few doctors, it was decided to provide all PHC centres with peak flow meters, whereas oximeter purchase was only considered if oxygen cylinders were available. Fibroscopes were considered useless. In contrast, in Tunisia, the full suggested list was retained. Disposable accessories and equipment maintenance have to be taken in account.

ARE THERE ANSWERS CONCERNING EFFICIENCY OF PAL IN VIEW OF ITS OUTCOMES?

To date there are ~50 countries with some form of PAL activity in different stages of the multi-step PAL implementation process [11]. Among them, 12 are at the phase of expansion; Chile and Kyrgyzstan have succeeded in implementing PAL in all PHC facilities within the public sector. In Europe, Belarus, Bosnia-Herzegovina, Kosovo, Ukraine and Lithuania are in the preliminary phase [36].

TABLE 1 Equipment required for practical approach to lung health strategy implementation[#]

First-level health facilities

- Sputum containers
- Peak flow meters with mouthpieces
- Inhalation chamber with masks (for children)
- Pulse oximeter
- Oxygen sources (cylinder and/or concentrators and accessories)
- Nebuliser with mask (manual at least)

District referral outpatient services or laboratories

- Binocular microscope
- Centrifuge and incubator (if cultures for TB are performed)
- Basic radiology equipment
- Spirometer
- Pulse oximeter
- Equipment for tracheal aspiration
- Oxygen sources
- Equipment for pleural drainage
- Needles and instruments for transthoracic pleural biopsy
- Blood gas analyser

Second referral level

- Bronchoscope (if there is a chest specialist trained to use it)

TB: tuberculosis. [#]: according to the World Health Organization practical approach to lung health implementation guideline [8].

The observed results concerning clinical, managerial and economic outcomes are summarised in tables 2 and 3.

How to improve the quality and efficiency of respiratory healthcare services to effectively manage respiratory infections, asthma and chronic obstructive lung diseases

Results of PAL training vary depending on the outcomes studied. The majority of results on PAL efficiency consist of indirect evidence. There are numerous reports on diagnosis pattern changes or prescription modifications. Direct assessment of treatment efficacy and impact on quality of life was identified in Nepal. Greater effectiveness of the treatment provided at PAL facilities was observed in patients with breathing difficulties and acute cough, while in terms of quality of life, patients with a chronic cough who were treated had better health-related outcomes [12]. Data collected on a routine basis in the PAL sites in Chile show that in 250 asthma patients after 1 yr of follow-up the number of hospitalisations and emergency room visits, as well as sleep disturbance and daily life limitations, in these patients had significantly decreased after PAL implementation [36].

The proportion of diagnosed cases of chronic respiratory diseases increased in the Jordan impact study [16]. In the same way, asthma diagnosis increased in Algeria after PAL training (15.3% *versus* 10.3%) [15], whereas in Syria, the proportion of patients with asthma remained at ~4.5% in both surveys, contrasting with an increase in COPD diagnosis (1.5% *versus* 0.7%) [14]. In Tunisia, chronic respiratory diseases exacerbation diagnosis increased after training at the expense of lower respiratory infections: chronic cough was more frequently associated with TB suspicion, sputum production with COPD and shortness of breath with asthma (Tunisian report on PAL

TABLE 2 Practical approach to lung health (PAL) reported results on clinical outcomes

Outcomes	Clinical outcomes	Countries
Diagnosis of chronic respiratory diseases[#]	Increase in diagnosis of CRD	Algeria, Chile, Jordan, Morocco, Kyrgyzstan, South Africa, Tunisia, Syria
Quality of care of asthma and COPD patients	Improvement of patients' management Improvement of patients' quality of life	South Africa, El Salvador Chile, Nepal
Tuberculosis	Improvement in the quality of the diagnostic process of TB Improvement in TB case detection	Algeria, Bolivia, Morocco, South Africa, Syria, Tunisia South Africa, Algeria
Treatment		
Antibiotics	Decrease in drug prescription, particularly antibiotics and adjuvant drugs	Algeria, Bolivia, El Salvador, Jordan, Kyrgyzstan, Morocco, Nepal, Syria, Tunisia
CRD drugs	PAL improves the quality of drug prescription for CRD patients Increase in inhaled steroid prescription Decrease in oral steroid prescription	Algeria, Chile, Jordan, Kyrgyzstan, Morocco, South Africa, Syria, Tunisia

COPD: chronic obstructive pulmonary disease; CRD: chronic respiratory diseases; TB: tuberculosis. [#]: asthma and COPD.

feasibility test). In Nepal, however, a shift in diagnoses toward more pneumonia cases and fewer chronic lung diseases was observed in the intervention group [12].

Given effective training and access to essential drugs, non-physicians can provide high-quality care to patients with allergic conditions [6]. Large improvements in the quality of asthma care were observed in South Africa [3]. PAL implementation in Nepal afforded better health for patients with a chronic cough, who are most likely to have COPD or TB [12].

PALSA increased appropriate care of respiratory conditions (20.8% of intervention arm *versus* 10.8% of control arm patients) [35]. The 10% risk difference for appropriate care included risk differences of 2% for TB case detection, 3% for urgent referrals and/or 6% for inhaled corticosteroid prescriptions [35].

In Kyrgyzstan, significant achievements were reported within the PAL implementation period as mortality rates from respiratory diseases were reduced by 23% [37].

The implementation of PAL guidelines promotes rational use of drugs for respiratory diseases [28]. Inappropriate reliance upon

antibiotics and underuse of inhaled corticosteroids in asthma are very frequent in PHC facilities [6]. Overuse of antibiotics due to underdiagnosis and misdiagnosis of respiratory conditions is a major concern [5, 6]. Preventing and managing antimicrobial resistance is imperative as the presence of multidrug-resistant organisms has generated substantial apprehension among clinicians and public health experts [38]. In addition, the current widespread use of fluoroquinolones for treating respiratory infections, where TB may be undiagnosed or missed, is a real threat not only to early TB diagnosis but also to adopting regimens containing quinolones [38, 39].

The PAL guidelines were particularly effective in reducing the average number of drugs prescribed per prescription at PAL facilities [12, 14]. In Nepal, the implementation of PAL guidelines implementation resulted in a reduction in multiple drug prescription and increased the prescription of generic drugs, as well as prescriptions from the essential drug list [12]. The same result was obtained in Jordan, Algeria, Bolivia and Tunisia with a drastic decrease in adjuvant drugs such as expectorants, anti-histamine, vitamins and non-steroidal anti-inflammatory drugs [13, 15, 16].

TABLE 3 Practical approach to lung health (PAL) reported results on managerial and economic outcomes

Outcomes	Clinical outcomes	Countries
Managerial		
Referral	Increase in respiratory disease management in primary healthcare Decrease in referral to upper health level	Bolivia, El Salvador, Guinea, Jordan, Kyrgyzstan, South Africa
Strengthening health services	Strengthening of health workers' self confidence Upgrading of health workers' skills	South Africa
Economic		
Cost	Reduction in the average cost of drug prescription per respiratory patient	Algeria, Bolivia, Jordan, Kyrgyzstan, Morocco, Syria, Tunisia
Patient out-of-pocket expense	Decrease in direct and indirect costs	Nepal
Cost effectiveness of PAL	Relatively cost effective	Nepal, South Africa

Among the patients who received a drug prescription, the proportion of those who were prescribed antibiotics and the number of antibiotics per drug prescription decreased in the majority of the countries, reflecting a better delineation of patients with antibiotic responsive disorders. Antibiotic prescription was reduced in Jordan [16], Kyrgyzstan [17], Syria [14] and Bolivia [13]. This decrease ranged between 11% and 27%. This reduction was observed in all categories of respiratory conditions in Syria [14]. It was mainly observed in patients with acute lower respiratory infections in Bolivia [13] and involved chronic respiratory diseases patients in Algeria [15]. Algerian physicians are accustomed to respecting national guidelines, such as antibiotic prescription recommendations in acute infections, explaining the lack of significant modification in these cases [15]. No modification in antibiotic use was reported in South Africa [3].

According to drug prescriptions, asthma management improved. A higher rate of prescriptions for inhaled corticosteroids (13.7% *versus* 7.7%) was observed in South Africa [5], Algeria [15], Syria [14] and Jordan (+166%), contrasting with a decrease in steroid injections [16]. In Kyrgyzstan, among the patients who received prescriptions for steroids, the proportion of prescribed inhaled steroids was five times higher in the impact survey [17]. In the same way, the proportion of inhaled β_2 -agonists towards the oral forms (syrup and pills) and theophylline increased [14–17]. In Bolivia, however, the prescription of inhaled corticosteroids remained low, due to cost and unavailability of inhaled drugs in the health facilities [13]. Cost, availability and patients' acceptance are the main barriers against the prescription of inhaled steroids.

The modifications observed in drug prescription obviously depend on guideline recommendations but also on previous habits. In countries where guidelines and training are largely used and respected, changing is easier.

How to improve the referral system for respiratory conditions, including TB

Referral modalities were detailed in the guidelines depending on the severity. Some guidelines, such as those from the Solomon Islands, comprised recommendations about hospital management after referral, defining the role of each health worker category and each healthcare level. Standardised back referral letters and chronic respiratory disease patient's medical cards including prescriptions and tests results were included within the PAL package in different countries.

Mixed results were observed depending on the country. In Kyrgyzstan, overall referral for hospitalisation, specialised advice, laboratory tests and chest radiography decreased in the impact survey by one third [17]. A decrease in ancillary tests, chest radiographies and referral for hospitalisation was observed in Algeria, contrasting with an increase for specialised advice [15]. The overall referral rate in Syria, increased from 4.5% in the baseline survey to 6.6% in the impact survey mainly due to the significant increase in referral for hospitalisation (0.3% to 1.2%) [14]. In the same way, in South Africa a higher proportion of severely ill patients in the intervention group were referred to a doctor [3]. In Tunisia, a higher proportion of patients were referred for complementary tests and specialist advice. This was in agreement with guideline

recommendations, which recommended this referral for newly diagnosed chronic respiratory diseases patients (Tunisia report on PAL feasibility test).

Keep TB high on the primary healthcare agenda and improve TB case detection, referral and the quality of care offered to TB patients

Use of PAL guidelines increased TB suspicion and TB detection in the majority of the countries [5, 13–15, 19, 35]. Detection was improved whatever the country prevalence of TB. Clinical signs were emphasised in the guidelines. Weight loss, pleuritic pain and night sweats were identified as predictive of TB in PALS studies with a positive likelihood ratio if all three symptoms were present [19]. Chest radiography was included early in the diagnosis process if chest radiographs were more easily available in PHC centres than sputum smear tests [15]. Using the PALS guideline, the sensitivity of nurses to detect patients with proven TB reached 90%, specificity was 65% and negative predictive value was 99% [19]. Although the proportion of sputum smear tests required was similar between the groups, the case detection of TB was higher in the PALS trained group (6.4% *versus* 3.8%), evidence for the effectiveness of the guideline as a screening tool for TB [3]. In Bolivia, the request for a sputum smear test was more accurate as it increased in those with respiratory symptoms for >15 days from 42.5% to 55.1% [13]. Training allowed not only for an increase of smear positive case detection, but also extrapulmonary TB diagnosis [15]. In South Africa, the PALS guideline was extended to cover HIV/AIDS care [40]. PALS PLUS significantly increased TB case detection and cotrimoxazole prophylaxis among HIV-infected patients [40].

In Kyrgyzstan, however, no improvement was observed concerning TB. The prevalence of TB among patients who underwent sputum smear test was 15.5% in the baseline survey and 5.5% in the impact survey. The National TB Programme was not involved in the development and implementation of the PAL study, and critical elements of the TB control programme may therefore have been missed in the training sessions [17]. In countries where positive results on TB detection were obtained, the National TB Programme was fully involved in the various phases of PAL development [14]. This suggests that involvement of the National TB Programme in PAL adaptation and development is crucial in order to improve the management of suspected TB cases as an integral part of the management of respiratory conditions.

Quality of care of TB patients improved [3]. After PALS and PALS plus interventions, among retreatment patients, cure or completion rates were significantly higher (OR 1.78), and default rates decreased (OR 0.25) [40]. Although not primarily focused on TB treatment, the interventions appeared to improve successful treatment completion rates among TB retreatment cases [40].

During 2009, PALS PLUS was adopted by the National Health Department for implementation throughout the country. Its implementation in additional provinces has been identified as a cornerstone of South Africa's TB control strategy [40].

An integrated management of TB and non-communicable respiratory diseases is essential. While infectious disease has dominated the disease burden in the developing world for

much of the last century, the incidence of many non-communicable diseases, such as cardiovascular diseases, diabetes, COPD and alcohol abuse, is growing in low- and middle-income countries [41]. This epidemiological shift adds to the existing infectious disease load, creating a double burden in these populations [41]. Existing concomitant disease was reported in 13–26% of respiratory cases [17]. With an increasing prevalence and focus on non-communicable diseases, clinicians treating TB need to acknowledge that they may deal with multiple diseases in a single patient [41]. The first step is to include non-communicable diseases in PAL guidelines, *e.g.* in Fiji, diabetes has already been included in the National TB Programme.

In South Africa, primary care physicians diagnosed associated asthma or COPD in 40% of TB patients [19]. This has been observed in other countries in which integrated diagnostic guidelines have been employed, and illustrates the need for integrated diagnostic guidelines that do not focus on TB alone, but seek to identify other common respiratory diseases that require management [19]. Individual smoking cessation support is essential in PAL strategy, not only to fight COPD and asthma worsening, but also to decrease TB burden. A large part of the TB burden in many regions of the world can be attributed to smoking as smokers have a two to three times elevated risk of TB [41]. Smoking also affects the chance of cure from TB. A few studies have found that smokers have a higher risk of death from TB and other poor treatment outcomes than nonsmokers [42]. In contrast, TB history seems to be an independent risk factor for COPD [41]. Therefore, identification of smokers and cessation treatments are essential components of the PAL strategy [43].

TB programmes can extend what have traditionally been disease-specific systems and, in the future, with increasing focus on PHC and health system strengthening, collaborative efforts will be necessary, as evidenced by recently developed frameworks for TB/HIV, and TB and smoking [43]. The concept of PAL was extended to involve other major diseases interacting with respiratory conditions; as is the case of HIV/AIDS in African countries. PALS PLUS integrates successful detection and management of HIV/AIDS patients [40].

Decrease drug costs

On the whole, the PAL strategy decreased drug expenditure for respiratory patients and improved the quality of care (table 4).

Average drug cost per prescription decreased significantly. Despite an increase in inhaled steroid cost [14], the reduction

ranged between 8% and 30% [12–16]. This was mainly due to adjuvant drug reduction in Jordan and Syria [14, 16]. In Syria and Kyrgyzstan, this decrease was highly significant in acute upper and lower respiratory infections, particularly with regard to the prescription of antibiotics [14, 17]. However, the average cost of the prescription of any drug tended to increase in chronic respiratory diseases patients; the proportional cost of corticosteroid prescriptions increased from 1.5% to 5.4% in Kyrgyzstan [12, 14, 17]. The cost of antibiotic prescriptions as a proportion of overall drug prescriptions decreased significantly at the expense of a significant increase in the proportion of bronchodilator and corticosteroid prescriptions [14].

At the patient level, patients' out-of-pocket expenses were reduced, mostly due to the lower average cost per drug prescription [12]. Patients visiting PAL facilities spent less on healthcare-related costs per episode and less on non-healthcare-related costs, which included travel and consultation fees [12]. PAL aims to reduce the costs by decreasing the number of visits and referrals.

Compared to usual care, treatment in keeping with PAL guidelines of a lung disease episode cost US\$1 more in Nepal and US\$1.5 more in South Africa [12, 35]. These differences were largely because of more clinic visits, TB tests, asthma medication and greater costs of travel and private providers, despite lower inpatient and ambulance costs [35]. Additional resources such as oxygen cylinders, extra medicine and spirometers may increase the cost.

Using the educational outreach method, training intervention costs an average of US\$1 per patient clinic visit [35]. However, it was more effective than usual training in improving TB, asthma and urgent respiratory care [35]. It increased cost-effectiveness by improving not only TB detection but also care of other conditions [35]. In the short term, the implementation of PAL requires an increased budget from the government but programme costs per episode would decrease if a high proportion of the population were reached. Therefore, before PAL is adopted, the initial increase in budget has to be guaranteed.

DIFFICULTIES DURING PAL IMPLEMENTATION

The short-term positive results and the possibility for further improvement should help keep the next PAL implementation phase flexible, taking into account the lessons learnt and allowing for future evaluation and monitoring [12]. National PAL implementation takes time and energy. Political commitment is mandatory to support the huge amount of work. In Bolivia, 2,274 PHC units of the Ministry of Health, 128 social

TABLE 4 Impact of practical approach to lung health on drug prescription in seven countries

	Algeria	Morocco	Kyrgyzstan	Tunisia	Jordan	Bolivia	Syria
Number of drugs per patient	-10.1***	-15***	-11.1***	-18.8***	-12.2***	-17.0***	-14.3***
Patients with antibiotic prescription	-10.0**	-25***	-22.0***	-21.1***	-15.9***	-12.3**	-33.3***
Drug prescription cost per patient	-13.6***	-18***	-32.4***	-19.3***	-8.7*	-17.7***	-26.2***

Data are presented as %. *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.

security units and 261 units of non-governmental organisations are involved [13].

It is unlikely that training alone would be effective in producing a lasting effect in clinical practice, even where the receptiveness for PAL guidelines is high among healthcare workers.

The assessment of PAL feasibility in rural Nepalese areas showed that to improve implementation, the national guidelines should be better and the implementation strategy upgraded [44]. It is vital to keep health centre staff engaged and aware of the value of the study. The integration of guidelines requires intensive collaboration, bringing together key personnel from multiple Ministry of Health Units and vertical disease programmes [45]. It is necessary to develop additional interventions that tackle culture-specific and health system-specific barriers [44].

Extended implementation throughout the country is mandatory to observe a true positive impact of PAL. Repeated evaluations have demonstrated that although IMCI can improve the quality of clinical care for sick children, coverage has rarely reached high enough levels to achieve the expected reductions in mortality [46].

GPs and nurses working in PHC centres expressed apprehension before PAL implementation as they were concerned about: excessive workload; imbalance in their relationship with referral doctors; contradictions with the numerous pre-existing guidelines; lack of regular treatment availability; and inaccessibility or delay in realisation of complementary tests, particularly chest radiography. They also underestimated their own skills and capacities. In addition, referral doctors were reticent to follow the guidelines. Difficulties encountered using the guidelines limit its use by the health workers. Many health workers stated that once they became familiar with its content, they did not use the PALM PLUS clinical tool routinely as they gained familiarity with the material [45]. Moreover, time pressures dissuaded them from its consultation [45].

The intervention increases costs in the short term, and requires some additional budgeting. One of the main weaknesses of the programme in Morocco, where PAL is fully implemented, is the lack of adequate funding [21].

However, PAL could be truly cost-effective, depending on how much funding partners were willing to pay for better care [35]. The aim is to provide patients with the best possible standards of care for the management of respiratory diseases in primary care [22].

There are few results on the long-term impact of PAL strategy. Evaluation of the effectiveness of the implementation strategy is, however, essential [22]. Monitoring must be severely integrated in PAL implementation in order to adjust guidelines and training [21], although monitoring indicators are difficult to define in view of improvement of quality of care in a syndromic approach.

Regular supervision of healthcare workers is necessary. Assessment of IMCI efficacy in Afghanistan showed that the frequency of supervision was significantly associated with improved quality scores [47]. Although supervision is important, it is difficult to maintain in developing countries [31].

IS PAL IMPLEMENTATION JUSTIFIED IN EUROPE?

TB continues to pose a public-health threat to the people of the member states of the European Union (EU) and European Economic Area (EEA) [4]. The majority of EU/EEA countries have a low incidence of TB; however, a heterogeneous setting exists with high incidences in the Former Soviet Union [48]. Moreover, 5.3% of all active TB cases reported in the EU/EEA are multidrug resistant [4]. Quality of care is not satisfactory all over the continent: three studies based in EU Member States with intermediate-to-low TB incidence (France, Germany and Spain) reported inappropriate treatment of cases in all three countries [49]. Bacteriological confirmation of TB cases was suboptimal [50]. Healthcare workers with inappropriate knowledge of treatment regimens (8–100%) or treatment duration (5–99%) were observed [51]; bearing in mind that inappropriate treatment is the major risk factor for development of multidrug resistant-TB [52]. Treatment modalities should improve in the EU, as acceptable levels of success rates are not always obtained, particularly among multidrug resistant-TB patients [39, 53].

The challenge in low-incidence settings is to maintain the knowledge of TB and, thus, awareness of treatment regimens and guidelines [49]. In low TB prevalence countries, the PAL strategy provides an incentive to expand the professional scope of the managers and clinicians specialised in TB and at the same time maintain their interest in TB control [21]. Clinical TB and multidrug resistant-TB management guidance needs to be strengthened and urgently implemented in the EU setting [50]. Thus, the highest possible standard of care needs to be provided to TB patients diagnosed each year in EU/EEA countries. Private practitioners and peripheral health services should be particularly targeted [50]. A tailored set of standards present the potential to improve [48]. EU standards for TB care have been developed as standards specifically tailored to the EU setting, in order to improve their acceptability among clinical networks [48]. However, GPs are much more frequently confronted with non-TB rather than TB respiratory patients. PAL, by keeping TB high in the agenda, can help to optimise TB care. Moreover, existing guidelines on respiratory diseases are not often followed in PHC. In this view, specially designed guidelines implemented through training sessions will probably act more efficiently.

CONCLUSION

Carefully developed and implemented homemade guidelines improve quality of care of respiratory patients, together with a reduction in drug expenditures. These positive results are observed in every setting; in low-income countries as well as wealthy countries, and in high and in poor PHC settings. Sustaining PAL activities should actually strengthen the health system at an affordable cost. Will European countries be reached by the PAL epidemic soon?

STATEMENT OF INTEREST

None declared.

REFERENCES

- 1 World Health Organization. Global tuberculosis control: surveillance, planning, financing. Geneva, WHO, 2004.
- 2 STOP TB Partnership. Stop TB Planning Tools for Global Fund Round 10 TB proposal preparation. Geneva, World Health Organization, 2010. www.who.int/tb/strategy/en

- 3 Fairall LR, Zwarenstein M, Bateman ED, *et al.* Effect of educational outreach to nurses on tuberculosis case detection and primary care of respiratory illness: pragmatic cluster randomized controlled trial. *BMJ* 2005; 331: 750–754.
- 4 Migliori GB, Sotgiu G, Blasi F, *et al.* Towards the development of EU/EEA Standards for Tuberculosis Care (ESTC). *Eur Respir J* 2011; 38: 493–495.
- 5 English RG, Bateman ED, Zwarenstein MF, *et al.* Development of a South African integrated syndromic respiratory disease guideline for primary care. *Prim Care Respir J* 2008; 17: 156–163.
- 6 English RG, Fairall LR, Bateman ED. Keeping allergy on the agenda: integrated guidelines for respiratory disease in developing countries. *Allergy* 2007; 62: 224–229.
- 7 Ottmani S, Scherpbier R, Pio A, *et al.*, eds. Practical Approach to Lung health (PAL): a primary health care strategy for integrated management of respiratory conditions in people of five years of age and over. WHO/HTM/TB/2005.351, WHO/NMH/CHP/CPM/CRA/05.3. Geneva, WHO, 2005.
- 8 World Health Organization. Practical Approach to Lung Health: Manual on initiating PAL implementation. WHO/HTM/TB/2008.410, WHO/NMH/CHP/CPM//08.02. Geneva, WHO, 2008.
- 9 Ottmani S, Mahjour J. The practical approach to lung health strategy for integrated respiratory care. In: Raviglione MC, ed. Reichman and Hershfield's Tuberculosis: a Comprehensive, International Approach. 3rd Edn. New York, Informa Healthcare USA, Inc., 2006: pp. 1059–1081.
- 10 Murray JF, Pio A, Ottmani S. PAL: a new and practical approach to lung health. *Int J Tuberc Lung Dis* 2006; 10: 1188–1191.
- 11 van den Boom M, Seita A, Ottmani S, *et al.* Finding the way through the respiratory symptoms jungle: PAL can help. *Eur Respir J* 2010; 36: 979–982.
- 12 Samir KC. Lung Health in Rural Nepal. Multi-State Modeling of Health Status and Economic Evaluation of Integrated Respiratory Care Guidelines. Laxenburg, International Institute for Applied Systems Analysis, 2009.
- 13 Camacho M, Nogales M, Manjon R, *et al.* Results of PAL feasibility test in primary care facilities in four regions of Bolivia. *Int J Tuberc Lung Dis* 2007; 11: 1246–1252.
- 14 Me'etary F, Ottmani S, Pio A, *et al.* Results of the feasibility test of the Practical Approach to Lung Health in the Syrian Arab Republic. *East Mediterr Health J* 2009; 15: 504–515.
- 15 Zidouni N, Baough L, Laid Y, *et al.* Practical approach to lung health strategy in Algeria. *Int J Tuberc Lung Dis* 2009; 13: 1029–1037.
- 16 Abu Rumman K, Ottmani S, Abu Sabra N, *et al.* Training on the practical approach to lung health: effect on drug prescribing in PHC settings in Jordan. *East Mediterr Health J* 2009; 15: 111–121.
- 17 Brimkulov N, Ottmani S, Pio A, *et al.* Feasibility test results of the Practical Approach to Lung Health in Bishkek, Kyrgyzstan. *Int J Tuberc Lung Dis* 2009; 13: 533–539.
- 18 Seung KJ, Rigodon J, Finch M, *et al.* Distribution of adult respiratory illnesses at a primary health centre in Lesotho. *Int J Tuberc Lung Dis* 2012; 16: 418–422.
- 19 English RG, Bachmann MO, Bateman ED, *et al.* Diagnostic accuracy of an integrated respiratory guideline in identifying patients with respiratory symptoms requiring screening for pulmonary tuberculosis: a cross-sectional study. *BMC Pulmonary Medicine* 2006; 6: 1.
- 20 Erhola M, Brimkulov N, Chubakov T, *et al.* Development process of the Practical Approach to Lung Health in Kyrgyzstan. *Int J Tuberc Lung Dis* 2009; 13: 540–544.
- 21 World Health Organization. Evaluation of the practical approach to lung health. Report of meeting held on 18–19 June 2007. WHO/HTM/TB/2008.396. Geneva, WHO, 2007.
- 22 van Schayck CP, Levy ML, Stephenson P, *et al.* The IPCRG Guidelines: developing guidelines for managing chronic respiratory diseases in primary care. *Prim Care Respir J* 2006; 15: 1–4.
- 23 Irwin RS, Baumann MH, Bolser DC, *et al.* Diagnosis and management of cough executive summary: ACCP evidence-based clinical practice guideline. *Chest* 2006; 129: Suppl. 1, 1S–23S.
- 24 Tomlins R, Williams S. The impact of the UK General Practice Airways Group (GPIAG) – an international perspective. *Prim Care Respir J* 2007; 16: 140–144.
- 25 Grimshaw JM, Thomas RE, MacLennan G, *et al.* Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol Assess* 2004; 8: iii–iv, 1–72.
- 26 Pinnock H, Thomas M, Tsiligianni I, *et al.* The International Primary Care Respiratory Group (IPCRG) Research Needs Statement 2010. *Prim Care Respir J* 2010; 19: Suppl. 1, S1–S20.
- 27 Ukwaja KN, Aina OB, Talabi AA. Clinical overlap between malaria and pneumonia: can malaria rapid diagnostic test play a role? *J Infect Dev Ctries* 2011; 21: 199–203.
- 28 Shrestha N, Samir KC, Baltussen R, *et al.* Practical Approach to Lung Health in Nepal: better prescribing and reduction of cost. *Trop Med Int Health* 2006; 11: 765–772.
- 29 Schull MJ, Banda H, Kathyola D, *et al.* Strengthening health human resources and improving clinical outcomes through an integrated guideline and educational outreach in resource-poor settings: a cluster-randomized trial. *Trials* 2010; 11: 118.
- 30 Vhuromu EN, Davhana-Maselesele M. Experiences of primary health care nurses in implementing management of childhood illnesses strategy at selected clinics of Limpopo Province. *Curationis* 2009; 32: 60–71.
- 31 Rowe AK, Onikpo F, Lama M, *et al.* The rise and fall of supervision in a project designed to strengthen supervision of Integrated Management of Childhood Illness in Benin. *Health Policy Plan* 2010; 25: 125–134.
- 32 Veron LJ, Blanc LJ, Suchi M, *et al.* DOTS expansion: will we reach the 2005 targets? *Int J Tuberc Lung Dis* 2004; 8: 139–146.
- 33 Goga AE, Muhe LM, Forsyth K, *et al.* Results of a multi-country exploratory survey of approaches and methods for IMCI case management training. *Health Res Policy Syst* 2009; 17: 18.
- 34 Bheekie A, Buskens I, Allen S, *et al.* The Practical Approach to Lung Health in South Africa (PALSA) intervention: respiratory guideline implementation for nurse trainers. *Int Nurs Rev* 2006; 53: 261–268.
- 35 Fairall L, Bachmann MO, Zwarenstein M, *et al.* Cost-effectiveness of educational outreach to primary care nurses to increase tuberculosis case detection and improve respiratory care: economic evaluation alongside a randomised trial. *Trop Med Int Health* 2010; 15: 277–286.
- 36 Ottmani SE. Practical approach to lung health. In: Jindal SK, ed. Textbook of Pulmonary and Critical Care Medicine. New Delhi, Jaypee Brothers Medical publishers, 2011; pp. 474–488.
- 37 Sydykova S, Brimkulov N. Kyrgyzstan Experience: Practical Approach to Lung Health Strategy: Solution for Controlling Common Respiratory Diseases. Geneva Health Forum, 18–20 April 2012.
- 38 Raviglione MC, Lange C, Migliori GB. Preventing and managing antimicrobial resistance: imperative for chest physicians. *Eur Respir J* 2011; 37: 978–981.
- 39 Zumla A, Blasi F, Raviglione M. Rational use of anti-tuberculosis drugs in the EU: better patient care and less drug resistance. *Eur Respir J* 2012; 39: 802–804.
- 40 Bachmann MO, Fairall LR, Lombard C, *et al.* Effect on tuberculosis outcomes of educational outreach to South African clinics during two randomised trials. *Int J Tuberc Lung Dis* 2010; 14: 311–317.
- 41 Creswell J, Raviglione M, Ottmani S, *et al.* Tuberculosis and noncommunicable diseases: neglected links and missed opportunities. *Eur Respir J* 2011; 37: 1269–1282.
- 42 van Zyl Smit RN, Pai M, Yew WW, *et al.* Global lung health: the colliding epidemics of tuberculosis, tobacco smoking, HIV and COPD. *Eur Respir J* 2010; 35: 27–33.

- 43 World Health Organization, International Union Against Tuberculosis and Lung Disease. A WHO/The Union Monograph on TB and Tobacco Control. Joining efforts to control two related global epidemics. WHO/HTM/TB/2007.390. Geneva, WHO, 2007.
- 44 ten Asbroek AH, Delnoij DM, Niessen LW, *et al.* Implementing global knowledge in local practice: a WHO lung health initiative in Nepal. *Health Policy Plan* 2005; 20: 290–301.
- 45 Sodhi S, Banda H, Kathyola D, *et al.* Evaluating a streamlined clinical tool and educational outreach intervention for health care workers in Malawi: the PALM PLUS case study. *BMC Int Health Hum Rights* 2011; 11: Suppl. 2, S11.
- 46 Chopra M, Binkin NJ, Mason E, *et al.* Integrated management of childhood illness: what have we learned and how can it be improved? *Arch Dis Child* 2012; 97: 350–354.
- 47 Edward A, Dwivedi V, Mustafa L, *et al.* Trends in the quality of health care for children aged less than 5 years in Afghanistan, 2004–2006. *Bull World Health Organ* 2009; 87: 940–949.
- 48 Migliori GB, Zellweger JP, Abubakar I, *et al.* European union standards for tuberculosis care. *Eur Respir J* 2012; 39: 807–819.
- 49 Langendam MW, van der Werf MJ, Huitric E, *et al.* Prevalence of inappropriate tuberculosis treatment regimens: a systematic review. *Eur Respir J* 2012; 39: 1012–1020.
- 50 Migliori GB, Sotgiu G, D'Ambrosio L, *et al.* TB and MDR/XDR-TB in European Union and European Economic Area countries: managed or mismanaged? *Eur Respir J* 2012; 39: 619–625.
- 51 van der Werf MJ, Langendam MW, Huitric E, *et al.* Knowledge of tuberculosis-treatment prescription of health workers: a systematic review. *Eur Respir J* 2012; 39: 1248–1255.
- 52 van der Werf MJ, Langendam MW, Huitric E, *et al.* Multidrug resistance after inappropriate tuberculosis treatment: a meta-analysis. *Eur Respir J* 2012; 39: 1511–1519.
- 53 Falzon D, Jaramillo E, Schünemann HJ, *et al.* WHO guidelines for the programmatic management of drug-resistant tuberculosis: 2011 update. *Eur Respir J* 2011; 38: 516–528.