

RESEARCH PAPER

Prioritising the respiratory research needs of primary care: the International Primary Care Respiratory Group (IPCRG) e-Delphi exercise

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Abstract

Background: Community-based care, underpinned by relevant primary care research, is an important component of the global fight against non-communicable diseases. The International Primary Care Research Group's (IPCRG's) Research Needs Statement identified 145 research questions within five domains (asthma, rhinitis, chronic obstructive pulmonary disease (COPD), smoking, respiratory infections).

Aims: To use an e-mail Delphi process to prioritise the research questions.

Methods: An international panel of primary care clinicians scored the clinical importance, feasibility, and international relevance of each question on a scale of 1-5 (5 = most important). In subsequent rounds, informed by the Group's median scores, participants scored overall priority. Consensus was defined as 80% agreement for priority scores 4 or 5.

Results: Twenty-three experts from 21 countries completed all three rounds. Sixty-two questions were prioritised across the five domains. A recurring theme was for 'simple tools' (e.g. questionnaires) enabling diagnosis and assessment in community settings, often with limited access to investigations. Seven questions recorded 100% agreement: these involved pragmatic approaches to the diagnosis of COPD and rhinitis, assessment of asthma and respiratory infections, management of rhinitis, and implementing asthma self-management.

Conclusion: Evidence to underpin the primary care approach to diagnosis and assessment and broad management strategies were overarching priorities. If primary care is to contribute to the global challenge of managing respiratory non-communicable diseases, policymakers, funders, and researchers need to prioritise these questions.

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Introduction

In September 2011 the General Assembly of the United Nations (UN) adopted a declaration on the Prevention and Control of Non-communicable Diseases (NCDs) which highlighted the 'rapidly growing magnitude of NCDs affecting people of all ages, gender, race and income levels'.¹ Acknowledging that the impact of NCDs (specifically including chronic respiratory disease) could be 'significantly reduced', the UN declaration encouraged a range of political, societal, and healthcare initiatives 'especially at the primary healthcare level'. Professional organisations actively supported the campaigning that led to this initiative.²⁻⁴

Pre-empting the UN call for facilitation of translational research to inform national and global action,¹ research agendas have been published from different professional and geographical perspectives.⁴⁻⁶ In line with the Action Plans of the World Health Organization, these emphasise the pivotal importance of evidence-based primary healthcare,^{7,8} although none explores the challenge specifically from the primary care perspective.

In June 2010 the International Primary Care Respiratory Group (IPCRG) began the process of addressing this gap by publishing a Research Needs Statement (RNS).⁹ It was hoped that the statement would be used by clinicians and patients campaigning for answers to questions relevant to the delivery of respiratory care in the community, to support researchers seeking funding to provide answers to these questions, and to inform funding bodies prioritising research agendas. An overarching theme was the need for research undertaken within primary care, recruiting participants representative of primary care populations, evaluating interventions realistically delivered over appropriate timescales within primary care, and drawing conclusions that will be meaningful to professionals working within primary care. The recent surge of interest in 'real-life' research reflects the importance of this agenda.¹⁰⁻¹²

Development of the IPCRG Research Needs Statement

The list of research questions in the RNS was compiled using an informal but inclusive consultation process.⁹ Draft statements in asthma, rhinitis, chronic obstructive pulmonary disease (COPD), tobacco dependence, and respiratory infections were circulated widely to a total of 42 participants from 22 countries including IPCRG members, other recognised experts, and representatives from a range of economic and healthcare backgrounds. Following an iterative process, a total of 145 questions was generated across five disease areas (asthma, n=47; allergic rhinitis, n=26; COPD, n=35; tobacco dependence, n=16; respiratory infections, n=21). Disease-specific questions focused on effective and cost-effective ways to prevent disease, confirm a diagnosis, assess control, manage treatment, and empower self-management. Practical questions were highlighted about how to deliver this comprehensive agenda in the diverse primary care settings of low and middle income countries as well as

relatively well-resourced healthcare systems.

Within this broad agenda, however, there was a need to prioritise and, in 2011, the IPCRG commissioned an e-Delphi consensus process to identify the priority research questions in each disease domain of the RNS.

Methods

Ethics

We were advised by the South East Scotland research ethics service that we did not require ethical approval for this study (personal communication, 17 December 2010).

e-Delphi methodology

Originating from the RAND Corporation in the 1950s,¹³ the Delphi method is a technique for reaching consensus among experts about topics for which there is limited evidence.¹⁴⁻¹⁷ The underlying concept is that an expert panel is recruited, the members of which contribute ideas and then rank suggestions in successive rounds until predefined consensus is reached. In each round, responses are influenced by summary feedback from previous rounds; however, the panellists work independently and their contributions are anonymous, thus giving equal weight to all perspectives and overcoming the potential bias introduced by powerful opinionated minorities in consensus meetings.¹⁷ As face-to-face discussion is not required, the exercise can be administered by e-mail. The technique has been widely used in a range of healthcare contexts including defining the components of an anaphylaxis plan,¹⁸ identifying safety standards of GP computer systems,¹⁹ and prioritising research needs within the UK.²⁰

The IPCRG e-Delphi

We undertook an international e-Delphi exercise which differed from the classic description in two important ways:

- We omitted the first step in which the expert panel is asked open questions and invited to contribute ideas for subsequent ranking.^{14,16} Instead, we started with the 145 research questions of the RNS which had already been generated by wide discussion among international experts in the field.
- A number of constructs (clinical importance, feasibility, and international relevance) were identified by the international research team as contributing to the final ranking of the priority of the research questions. To ensure that participants considered all three aspects, in the first round we asked the panel to score each question against each of the three constructs and then in the second and subsequent rounds to take an overview of the rankings as a priority for the IPCRG.

Recruitment of an expert panel

The IPCRG is an umbrella organisation for 18 national primary care respiratory organisations and 28 individual associate members from countries with no national organisation. To achieve a broad geographical spread, we aimed to recruit an expert panel with representatives of primary care-based clinicians

from our member countries and as many as possible of the associated countries, ensuring that we also encompassed relevant clinical, research, and educational expertise.^{15,17} We compiled a list of:

- Authors and contributors of the RNS (excluding the team conducting the Delphi exercise).
- Members of the IPCRG research sub-committee and research network.
- Representatives of the member and associate member countries.
- Members of the IPCRG education sub-committee and panel.

After removing duplication, the potential pool was 63 people from 34 countries. An e-mailed invitation was sent to all potential members which included a description of the process, the anticipated timescale, and the estimated commitment. We made it clear that we expected participants to contribute to all three rounds.

Piloting

We piloted the process to ensure that the instructions were clear, data collection was feasible, and the process of data entry, analysis and feedback of results at each round was streamlined. Minor adjustments were made to the instructions to improve clarity.

The e-Delphi consensus process

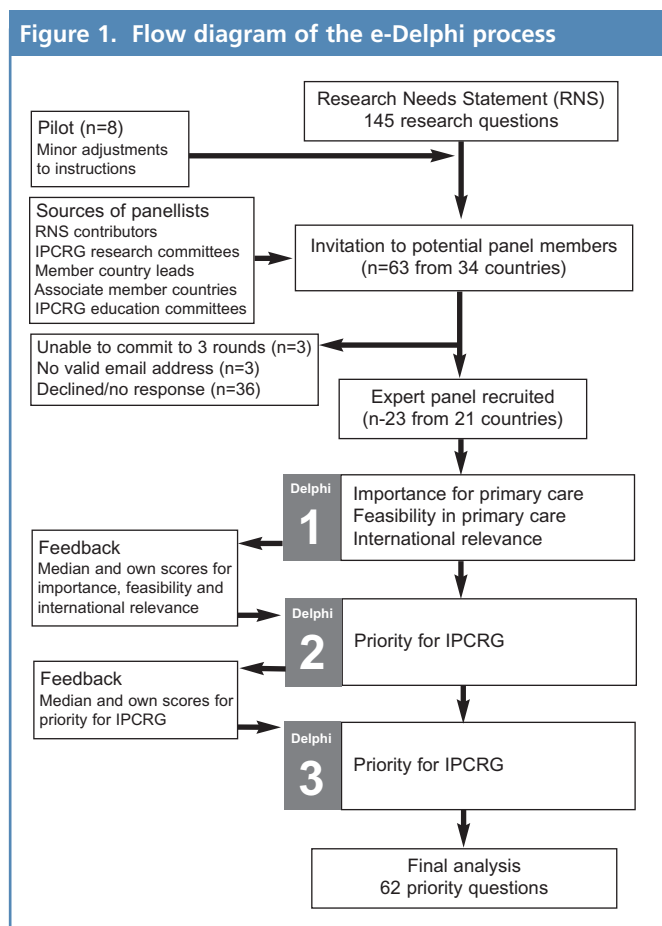
Figure 1 illustrates the flow of the e-Delphi consensus process which took place over 5 months in Spring 2011. In each of the three rounds, panel members were asked to return their completed spreadsheets within 2 weeks, with a reminder being sent to non-responders the day after the due date with a 3-day deadline.

Round 1

The research questions were reproduced verbatim from the RNS on an Excel spreadsheet (Microsoft Corporation, Washington, USA). Panel members were asked to score each research question on a scale of 1–5 against three constructs (where 1 is the least and 5 is the most important/feasible/international ly relevant).

- Importance for primary care practice: Participants were asked to answer the following question from their perspective as a primary care clinician and/or researcher. *“How important is it for improving the care of people with respiratory conditions in your healthcare system to have the answer to this question?”*
- Feasibility to be conducted in primary care: Participants were asked to consider the following question from their perspective as a primary care clinician and/or researcher. *“How feasible do you think a research project in this area would be in your healthcare setting?”*
- Potential for international collaboration: *“What is the potential for collaborative research to answer this question involving a number of countries, either working together or comparing between healthcare systems?”*

Figure 1. Flow diagram of the e-Delphi process



The results were collated onto an Excel spreadsheet and a median score was calculated for each of the three constructs.

Round 2

The second round spreadsheet included the median scores from round 1 for each of the three constructs as well as the participant's own score. Respondents were asked to trade off or balance the importance, feasibility, and international relevance of each question and to decide on the priority of each question for the IPCRG.

- Overall priority: Participants were asked to score the overall priority for the IPCRG (*“Which of these research questions should the IPCRG invest time, money and effort in trying to answer?”*), allocating a score of 1–5 (where 1 is the lowest and 5 is the highest priority).

The results were collated onto an Excel spreadsheet and an overall median score was calculated for each research question.

Round 3

The median scores for each question were entered onto the round 3 spreadsheet and fed back to individual panel members along with their own score.¹⁴ Panel members were then given the opportunity to revise their opinions on the overall priority of each question for the IPCRG in the light of the findings of the previous round by again ranking each research question on a score of 1–5.

Table 1. Countries of origin and professional background of the expert group

Region	Countries	Professional role
Northern Europe	Sweden, Netherlands, Norway, UK, Denmark, Germany	5 Academic GPs 1 Clinical GP
Southern Europe	Greece, Portugal, Turkey, Spain, Italy	4 Academic GPs 1 Clinical GP
Russia and Eastern Europe	Russia, Romania, Poland	1 Allergy specialist 2 Clinical GPs
Indian and the Far East subcontinent	India, Singapore, Vietnam	2 Academic GPs 1 respiratory clinician
South and North America	Chile, Argentina, Canada	3 Clinical GPs
Australasia	Australia, New Zealand	1 Academic GP 2 Educationalist GPs

Analysis of data

We calculated median scores for each of the questions and the proportion of respondents agreeing that the question was a priority.¹⁷ Consensus was defined *a priori* as 80% agreement for the priority score of 4 or 5. We anticipated that three rounds would allow an acceptable degree of agreement on research priorities but, if not, a final fourth round using the format of round 3 would be undertaken.

In order to enable overarching themes to be identified, four members of the research team (HP, BS, IT, AO) coded the questions into categories (e.g. diagnosis, management, organisation of care). Disagreements were resolved by negotiation.

Results

We recruited 23 participants from 21 countries to the expert panel. Table 1 lists the countries of origin and professional background of the participants. Participants included 11 (61%) of the IPCRG member countries and 10 (36%) of the associate member countries. All the participants completed all three rounds.

Proportion reaching consensus thresholds

Of the 145 research questions, 62 achieved the *a priori* consensus level of 80% agreement with priority scores of 4 or 5. Seven questions achieved 100% agreement and 24 reached a consensus threshold of 90%. The prioritised questions were evenly distributed across all five disease domains (Table 2).

Prioritised questions in each disease domain

The 62 questions in the five disease domains prioritised at the 80% threshold are listed in Tables 3–7. All the seven questions achieving 100% consensus emphasised the need for a practical ‘primary care approach’. Two questions were in the asthma domain (‘simple’ tools for assessing control and implementing self-management), two in the allergic rhinitis domain (diagnosing the

Table 2. Number of questions prioritised in each domain and category

	Number of questions at each threshold			
	RNS	80%	90%	100%
Disease domain, n (% of RNS questions)				
All	145	62 (43%)	24 (17%)	7 (5%)
Asthma	47	20 (43%)	9 (19%)	2 (4%)
Allergic rhinitis	26	9 (35%)	3 (11%)	2 (8%)
COPD	35	19 (54%)	6 (17%)	2 (6%)
Tobacco dependence	16	9 (56%)	2 (13%)	0
Respiratory infections	24	5 (21%)	5 (21%)	1 (4%)
Category, n (% of questions at that threshold)				
Management	23 (16%)	12 (19%)	6 (25%)	1 (14%)
Organisation	21 (14%)	5 (8%)	0	0
Diagnosis	20 (14%)	12 (19%)	9 (38%)	4 (57%)
Assessment	20 (14%)	17 (27%)	7 (29%)	1 (14%)
Self-management	12 (8%)	3 (5%)	1 (4%)	1 (14%)
Prevention	9 (6%)	2 (3%)	0	0
Pharmacological	8 (6%)	2 (3%)	0	0
CPD	8 (6%)	3 (5%)	0	0
Further tests	6 (4%)	1 (2%)	1 (4%)	0
Co-morbidity	6 (4%)	2 (3%)	0	0
Diversity	6 (4%)	0	0	0
Compliance	5 (3%)	3 (5%)	0	0
Epidemiology	1 (1%)	0	0	0

CPD = Continuing Professional Development

Figure 2. Prioritisation of the different categories of questions

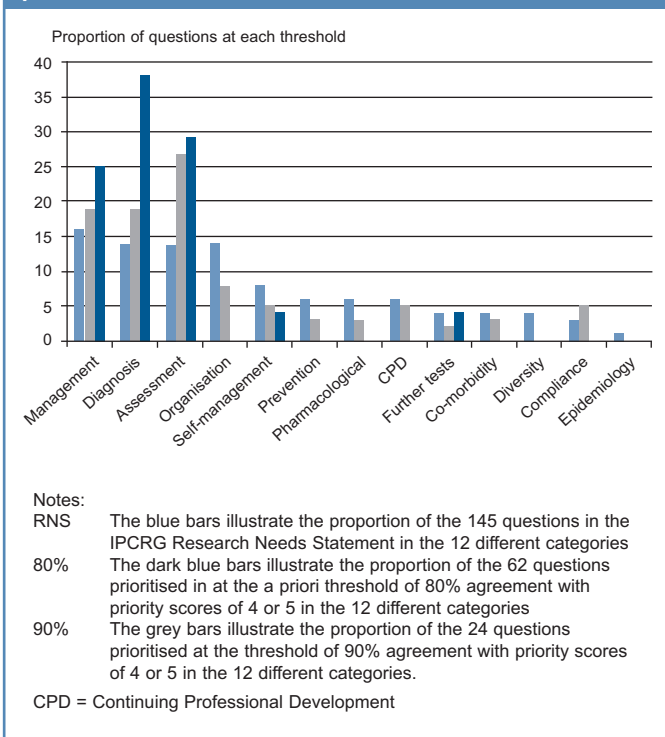


Table 3. Consensus on the research priorities in asthma listed in rank order

Category	Research question
Assessment	What simple tools enable assessment of asthma control and is their use acceptable and feasible in primary care?
Self-management	How can guided self-management be implemented in real-life primary care practice?
Diagnosis	How can asthma be diagnosed earlier in primary care?
Management	How and when should regular medication be stepped down or stopped?
Diagnosis	What practical algorithms could distinguish between recurrent wheeze/asthma and other acute respiratory diseases including pneumonia for young children presenting to primary care?
Management	How can good and poor inhaler technique be identified and what is the best strategy for ensuring good inhaler technique?
Diagnosis	How can remote areas or developing countries diagnose and manage asthma with limited or no availability of diagnostic tests?
Management	How should acute severe asthma be managed in settings where emergency department and hospital are not accessible?
Diagnosis	What is the role of symptom-based tools for diagnosing asthma in primary care?
Compliance	What is the impact of patients' comprehension of the disease, use of different treatment strategies, treatment cost (in high and low income countries and between social groups) and concern about side effects of inhaled steroids on adherence to prescribed treatment
Assessment	What is the importance of co-morbidity (especially psychological morbidity) and socio-economic factors in identifying those at risk of very severe attacks?
Compliance	How may these issues of adherence be addressed (especially in sub-groups such as the adolescent patient with asthma)?
Management	What is the preferred management (including appropriate inhalation device) of moderate exacerbations in primary care, including in clinical situations where treatment options are limited?
Self-management	Why are professionals reluctant to provide asthma action plans to their patients and how may this be overcome?
Assessment	Is an assessment of severity needed in addition to an assessment of asthma control in primary care?
Assessment	What is the role of lung function testing, in regular monitoring of asthma patients in primary care?
Assessment	What is the validity and usefulness of questionnaires for assessing quality of life (or other outcomes) when used for individual patients in routine primary care clinical practice
Assessment	What is a practical approach to the assessment of severity of acute asthma in primary care settings with limited diagnostic resources?
Organisation	What are effective approaches to developing a partnership with the patient?
Management	What is the most effective add-on therapy option to inhaled corticosteroids in different sub-groups of asthma?

Table 4. Consensus on the research priorities in allergic rhinitis listed in rank order

Category	Research question
Management	What (combinations of) management strategies for treating rhinitis improve asthma control and/or improve quality of life?
Diagnosis	What tools (e.g. validated, symptom-based questionnaires for rhinitis or screening for atopy) could help the primary care clinician differentiate between allergic and non-allergic rhinitis, rhinosinusitis, common cold and other clinically similar conditions?
Assessment	What questions for use in primary care practice will determine rhinitis control and identify those at risk of worsening symptoms and/or onset of co-morbid asthma?
CPD	What are the educational needs of primary care clinicians and how may these be met? Can an educational intervention improve awareness and clinical skills of GPs and improve clinical outcomes in allergic rhinitis?
Compliance	How can compliance with treatments be improved?
Management	Is the ARIA classification useful in guiding prescribing in primary care?
Prevention	Does early and aggressive treatment of atopic children with allergic rhinitis (e.g. with topical nasal steroids and/or immunotherapy) prevent the progression to asthma?
Assessment	Are clinicians aware of the asthma-rhinitis link and to what extent do they seek information about allergic rhinitis when seeing asthmatic patients?
Management	What is the best technique for using nasal sprays? What do doctors, pharmacists, and patients know of correct nasal inhalation technique?

CPD = Continuing Professional Development.

Table 5. Consensus on the research priorities in chronic obstructive pulmonary disease (COPD) listed in rank order

Category	Research question
Diagnosis	Can the use of a simple validated questionnaire improve the accurate identification of COPD in different countries (including those without access to spirometry)?
Diagnosis	When a primary care approach to the diagnosis of COPD is applied, what is the diagnostic yield compared with currently accepted diagnostic criteria?
Diagnosis	What is the best way to identify and diagnose COPD in primary care? Does this incorporate history, age, symptoms and spirometry?
Assessment	Which measurements (spirometry, breathlessness scores, exercise tolerance, symptom/control scores, COPD-specific or generic Quality of Life questionnaires) are feasible and provide useful information for routine monitoring and assessing effectiveness of treatment in primary care worldwide
Management	What is the best palliative treatment for severe dyspnoea?
Assessment	Are composite measures (such as the DOSE index or ADO-index) feasible in primary care within a range of healthcare settings and valid compared with established indices (e.g. BODE)
Co-morbidity	What are the optimum treatment regimes (including the impact of polypharmacy) for people with COPD and co-morbid conditions such as cardiovascular disease, diabetes or dementia?
Assessment	In the context of COPD, what are the key questions that accurately assess smoking history, provide a sensitive and specific assessment of tobacco addiction and motivation for smoking cessation?
Diagnosis	What is the extent of under- (and over-diagnosis) of COPD in primary care communities in different countries, and to what extent are patients who smoke (or exposed to burning biomass fuels) proactively screened for COPD?
Diagnosis	Which approach to early COPD diagnosis in primary care is underpinned by the strongest clinical and health economic evidence base (questionnaires and/or spirometry, screening or case finding)?
Pharmacological	What is the role of low-dose theophylline, especially in low income countries where it may be one of the few treatments available?
Management	How should people with GOLD mild or moderate COPD be managed in primary care with regard to lifestyle advice (smoking cessation, dietary advice), therapeutic treatment (anti-inflammatory and/or bronchodilators), and physical activity (pulmonary rehabilitation) in order to improve outcomes in different healthcare settings?
CPD	What is an appropriate standard of spirometry training for primary care clinicians?
Co-morbidity	Which are the most prevalent co-morbidities in people with COPD in different countries and what examinations and tests should be undertaken routinely in order to detect co-morbidities?
Diagnosis	What are the essential parameters (e.g. FEV ₁ /FVC and/or FEV ₁ /FEV ₆ , inspiratory measurements) of spirometry in primary care?
Organisation	How should the self-management education programme be adapted for different severities of disease and/or different healthcare systems?
Self-management	What is the optimal format of self-management education (including the information content, individualisation of the plan, written or electronic delivery, professional or lay educators) in order to ensure effective communication with patients (often from deprived communities), facilitation of adherence to treatment, and a positive impact on health status?
Pharmacological	Should choice, dose, and duration of treatment (oral corticosteroids, antibiotics) be different for different severity of COPD and severity of exacerbations? Is there a role for inhaled steroids in exacerbations of COPD?
Assessment	What impact does immediate access to investigations (e.g. chest x-ray, oxygen saturation, C reactive protein) have on the primary care management of people with acute exacerbations of COPD and the decision to refer?

cause of nasal symptoms and management strategies), two in the COPD domain (diagnosis in primary care) and one in the respiratory infections domain (identifying when antibiotics were indicated). The 83 questions not prioritised are listed in Appendices 1–5, available online at www.thepcrj.org.

Over-arching themes

The questions were allocated to 12 categories (listed in Table

2). Comparison of the relative proportion of questions from each category prioritised at the 80% and 90% thresholds with the 145 questions of the RNS illustrates the prioritisation process; for example, 40 (28%) of the 145 questions in the RNS related to diagnosis or assessment. These questions were actively prioritised, accounting for 29 (46%) of the 62 questions which achieved consensus at the 80% level and 16

Table 6. Consensus on the research priorities in tobacco dependence listed in rank order

Category	Research question
Management	How can brief advice be used more effectively to increase motivation to quit, and what elements are most efficient for a busy primary care practitioner?
Assessment	What questions provide the most sensitive and specific assessment of tobacco dependence and motivation to quit, and of the smoker's individual needs?
Prevention	How can primary care clinicians in different countries be made more aware of strategies to prevent smoking in young people and in pregnancy?
Organisation	What models of providing smoking cessation services overcome known barriers (e.g. time, accessibility, expertise) and are acceptable, feasible, effective, and cost-effective in primary care settings worldwide?
Organisation	How can brief advice be implemented in different healthcare systems and different clinical (e.g. pregnancy, existing chronic obstructive pulmonary disease or heart disease, asthma, high risk groups) and psychosocial situations (e.g. those not planning a quit attempt)?
Assessment	What are the benefits of using of questionnaires (e.g. 'willingness to quit', 'addiction to nicotine') in routine clinical practice?
CPD	How can the knowledge of primary healthcare professionals about chronic nicotine addiction be increased (including smoking cessation training programmes)?
Organisation	What are the most effective models (including primary healthcare or specialist smoking cessation teams) of providing smoking cessation support services in different cultural and/or socioeconomic settings?
Assessment	What questions or simple instruments can be used to assess risk of relapse in primary care consultations?

Table 7. Consensus on the research priorities in respiratory infections listed in rank order

Category	Research question
Diagnosis	How can primary care clinicians reliably identify patients who would benefit from antibiotic therapy? What diagnostic criteria are used in deciding on antibiotic treatment in high, middle and low income countries in primary healthcare settings?
Assessment	How can primary care clinicians differentiate between serious and self-limiting LRTIs?
Further tests	Which near patient tests can contribute to cost-effective management of LRTI in primary care by reducing inappropriate antibiotic use without compromising outcomes?
Assessment	Which subgroups of patients with LTRIs need antibiotic treatment?
Management	Should management strategies for LRTI be different in subgroups with various co-morbidities, in smokers, in the elderly, in children, and in pregnant women?

LRTI = lower respiratory tract infections.

(67%) of the 24 questions achieving 90% agreement. This process is illustrated for each of the categories in Figure 2.

Discussion

Main findings

The five disease areas all included priorities for the international primary care expert group in our study and a range of specific questions were highlighted within each domain. A number of overarching priorities could be identified. The need for 'simple tools' for establishing a diagnosis and assessing severity within low-technology consultations in primary care were prioritised over more complex investigations, broad management strategies were of more interest than evidence about efficacy of individual treatments, and practical approaches were sought for supporting self-management and lifestyle change.

Strengths and limitations of this study

Our expert panel of 23 primary care clinicians is unlikely to have

represented the full range of perspectives from community-based care globally. In many countries primary healthcare is poorly developed with no co-ordinating body that can represent their views, and other techniques will be required to explore their views. However, our participants were all actively involved in primary care and represented 21 countries with a broad range of economic backgrounds and healthcare systems. This is a similar number to expert panels in other reported e-Delphi studies.^{18,19} Importantly, all the participants contributed to all three rounds, enabling a consensus to be reached.

We did not formally request free text contributions (although suggestions could have been made in the covering e-mail) because the aim of the e-Delphi process was to prioritise the existing questions from the RNS which had already attracted contributions from the global membership of the IPCRG.⁹

Categorising the questions proved useful for identifying overarching themes but had the limitation that some questions

could have fitted more than one category. For example, some of the questions coded as 'management' overlapped with 'organisation of care'. Although it was an overarching theme of the RNS,⁹ we did not include a category for guideline implementation because the relevant questions were already included as disease-specific priorities.

Interpretation of findings in relation to previously published work

In line with global priorities,^{1,3,4,7,8} a recently published research agenda for prevention and control of chronic respiratory diseases from the public health perspective highlighted the role of primary care in meeting the challenge of respiratory NCDs.⁵ Our findings complement this paper by defining the evidence needed to inform management of common respiratory conditions in primary care settings. There was universal agreement (from relatively well-resourced healthcare systems as well as low and middle income countries) that there was a need in all the disease domains to understand better the role of asking the right questions, using questionnaires and 'simple' investigations readily available in all surgeries to identify, diagnose, and assess patients with respiratory disease. This was not to downgrade the importance of diagnostic investigations (indeed, achieving standards for primary care spirometry was one of the prioritised questions) but recognises that access to such investigations may be limited in many healthcare systems and that there is a need to maximise the potential of what can be achieved with minimal equipment in a consultation. A recent example which resonates with the stepwise approach to diagnosing respiratory disease advocated by the Global Alliance against Chronic Respiratory Diseases⁴ is the identification of potential COPD with a short questionnaire and a Piko-6[®] meter enabling targeted spirometry.²¹

The recognised challenge of diagnosing community-acquired pneumonia in primary care and, more pragmatically, deciding which patients with chest infections should be treated with antibiotics was highlighted as a research priority by our expert panel. A recent consensus initiative has developed definitions of respiratory infections which 'maintain relevance to everyday practice and are not over-reliant on investigations' which it is hoped will be more resonant with the needs of primary care research and clinical practice.²² Reinforcing the overarching theme of adopting a 'primary care approach', adapting evidence from hospital settings may be unhelpful. For example, the CRB-65 score²³ designed to predict outcome in confirmed pneumonia in secondary care has been shown not to be helpful to the primary care clinician deciding on a management strategy without the benefit of a chest x-ray.²⁴

Overall management strategies were of more interest than the efficacy of specific drugs or treatments, reflecting the recent interest in 'real-life' studies.^{11,12} Such studies not only inform the use of different therapeutic options in unselected populations⁹ but also provide evidence for how care may be organised to meet the needs of practice populations.²⁵ Guidelines, typically

reliant on evidence from traditional randomised clinical trials, are complemented by real-world studies to inform implementation.^{26,27}

Implications for future research, policy and practice

Policy documents and research agendas universally agree that primary care is an important component of the fight against NCDs.^{1,3,4,5,7,8} Our prioritisation exercise contributes to the debate by highlighting the basic pragmatic questions which tax primary care clinicians globally. Crucially, evidence is needed about how – with only the 'simple' tools available in a consultation – a diagnosis may be suspected and a known respiratory condition assessed. Effective management strategies need to be informed by research recruiting populations typical of the broad spectrum of primary care.

It is our hope and expectation that this global prioritisation exercise will act as a stimulus to researchers, funders, and commissioners to focus research efforts on the areas of greatest need. Reflecting the diversity of healthcare systems in low, middle, and high income countries, many of the priority areas can be addressed by appropriately designed and funded projects in individual countries tailored to local recruitment, feasibility, sociocultural, and funding issues. Some priorities may be best addressed through multinational collaboration. Although the IPCRG is unable to commission or fund projects systematically, it can focus its expertise and support on small-scale pilot work which underpins programmes of work in line with the priorities, and broker international collaboration such as the UNLOCK project.²⁸ The IPCRG research network will continue to monitor, assess, and highlight ongoing primary care research needs, thus providing a robust platform on which grass-root level researchers can build as they seek to justify their projects to funding authorities.

Conclusions

The hope was expressed with the launch of the RNS that it would influence funders and researchers to prioritise real-life primary care respiratory research. In an era when 'comprehensive strengthening' of primary care is seen as an important component of the global response to the increasing burden of NCDs,^{1,29} this hope must become a reality.

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Conflicts of interest HP has received fees for lecturing or attending advisory groups from GlaxoSmithKline (GSK), AstraZeneca, Boehringer Ingelheim and has

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Contributorship HP with OY initiated the idea for the study and led the development of the protocol, supervised the study administration, data analysis, interpretation of results, and writing of the paper. All the authors contributed to the protocol, helped with piloting the process and supported the analysis, interpretation and writing of the paper. All authors reviewed the final manuscript. HP is the study guarantor.

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References

- United Nations General Assembly: Sixty-sixth session. Political declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases. New York: United Nations, 2011.
- International Primary Care Respiratory Group. IPCRG campaigns. <http://www.theipcrj.org/campaigns/index.php> (accessed October 2011).
- Non-Communicable Disease Alliance. Proposed outcomes document for the United Nations high level summit on non-communicable diseases. Geneva: NCD Alliance, 2010. <http://www.ncdalliance.org/od> (accessed October 2011).
- World Health Organization. Global Alliance against Chronic Respiratory Diseases. Global surveillance, prevention and control of chronic respiratory diseases: a comprehensive approach. Geneva: World Health Organization, 2007.
- Bousquet J, Kiley J, Bateman ED, et al. Prioritised research agenda for prevention and control of chronic respiratory diseases. *Eur Respir J* 2010;**36**:995-1001. <http://dx.doi.org/10.1183/09031936.00012610>
- McCarthy M, Maher D, Ly A, Ndiip A. Developing the agenda for European Union collaboration on non-communicable diseases research in sub-Saharan Africa. *Health Res Policy Syst* 2010;**8**:13. <http://dx.doi.org/10.1186/1478-4505-8-13>
- World Health Organization. 2008-2013 Action Plan for the global strategy for the prevention and control of non-communicable diseases. Geneva: World Health Organization, 2008.
- World Health Organization. Global alliance against chronic respiratory diseases. Action Plan 2008-2013. Geneva: World Health Organization, 2008.
- 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-S21. <http://dx.doi.org/10.4104/pcrj.2010.00021>
- Price D, Musgrave SD, Shephstone L, et al. Leukotriene antagonists as first-line or add-on asthma-controller therapy. *N Engl J Med* 2011;**364**:1695-707. <http://dx.doi.org/10.1056/NEJMoa1010846>
- Dahlén S-E, Dahlén B, Drazen JM. Asthma treatment guidelines meet the real world. *N Engl J Med* 2011;**364**:1769-70. <http://dx.doi.org/10.1056/NEJMe1100937>
- Ducharme FM. Leukotriene receptor antagonists as first line or add-on treatment for asthma. *BMJ* 2011;**343**:d5314. <http://dx.doi.org/10.1136/bmj.d5314>
- Dalkey N, Helmer O. An experimental application of the Delphi method to the use of experts. *Manage Sci* 1963;**9**:458-67. <http://dx.doi.org/10.1287/mnsc.9.3.458>
- Hasson F, Keeney S, McKenna H. Research guidelines for the Delphi survey technique. *J Advanced Nursing* 2000;**32**:1008-15.
- Okoli C, Pawlowski SD. The Delphi method as a research tool: an example, design considerations and applications. *Inform Manage* 2004;**42**:15-29. <http://dx.doi.org/10.1016/j.im.2003.11.002>
- Powell C. The Delphi technique: myths and realities. *J Advanced Nursing* 2003;**41**:376-82. <http://dx.doi.org/10.1046/j.1365-2648.2003.02537.x>
- Murphy MK, Sanderson CFB, Black NA, et al. Consensus development methods and their use in clinical guideline development. *Health Technol Assess* 1998;**2**(3):1-88.
- Worth A, Nurmatov U, Sheikh A. Key components of anaphylaxis management plans: consensus findings from a national electronic Delphi study. *J R Soc Med Sh Rep* 2010;**1**:42.
- Avery AJ, Savelyich BSP, Sheikh A, et al. Identifying and establishing consensus on the most important safety features of GP computer systems: e-Delphi study. *Informatics Prim Care* 2005;**13**:3-11.
- Sheikh A, Major P, Holgate ST. Developing consensus on national respiratory research priorities: key findings from the UK Respiratory Research Collaborative's e-Delphi exercise. *Respir Med* 2008;**102**:1089-92. <http://dx.doi.org/10.1016/j.rmed.2008.03.006>
- Sichletidis L, Spyrtatos D, Papaioannou M, et al. A combination of the IPAG questionnaire and PiKo-6® flow meter is a valuable screening tool for COPD in the primary care setting. *Prim Care Respir J* 2011;**20**:184-9. <http://dx.doi.org/10.4104/pcrj.2011.00038>
- Greene G, Hood K, Little P, et al. Towards clinical definitions of lower respiratory tract infection (LRTI) for research and primary care practice in Europe: an international consensus study. *Prim Care Respir J* 2011;**20**:299-306. <http://dx.doi.org/10.4104/pcrj.2011.00034>
- Lim WS, Baudouin SV, George RC, et al. BTS guidelines for the management of community acquired pneumonia in adults: update 2009. *Thorax* 2009;**64**(Suppl 3):iii1-55. <http://dx.doi.org/10.1136/thx.2009.121434>
- Francis NA, Cals JW, Butler CC, et al, on behalf of the GRACE Project Group. Severity assessment for lower respiratory tract infections: potential use and validity of the CRB-65 in primary care. *Prim Care Respir J* 2011; E-pub, <http://dx.doi.org/10.4104/pcrj.2011.00083>
- Pinnock H, Adlem L, Gaskin S, Harris J, Snellgrove C, Sheikh A. Accessibility, clinical effectiveness and practice costs of providing a telephone option for routine asthma reviews: controlled implementation study. *Br J Gen Pract* 2007;**57**:714-22.
- Holgate S, Bisgaard H, Bjermer L, et al. The Brussels Declaration: the need for change in asthma management. *Eur Respir J* 2008;**32**:1433-42. <http://dx.doi.org/10.1183/09031936.00053108>
- Olesen F. Putting research into clinical practice. *BMJ* 2011;**343**:d3922. <http://dx.doi.org/10.1136/bmj.d3922>
- Chavannes N, Stallberg B, Lisspers K, et al. UNLOCK: Uncovering and Noting Long-term Outcomes in COPD to enhance Knowledge. *Prim Care Respir J* 2010;**19**:408. <http://dx.doi.org/10.4104/pcrj.2010.00084>
- World Health Organization. Global status report on non-communicable diseases 2010. Geneva: World Health Organization, 2010.

Available online at <http://www.theipcrj.org>

Appendix 1. Research questions in asthma which did not reach 80% consensus threshold		
Category	Research question	Agreement
Organisation	Are any models of healthcare better than others in terms of clinical and cost effectiveness for management of asthma?	78%
Co-morbidity	Does the detection and treatment of co-morbidities (anxiety and depression, obesity) improve outcomes for people with asthma?	78%
Diagnosis	To what extent are small children with recurrent wheeze misdiagnosed in primary care and with what consequences for morbidity?	78%
Prevention	What are the important environmental risk factors (including indoor biomass fuel smoke, cigarette smoking and environmental pollution, aeroallergens, dietary and lifestyle factors) in different countries and what preventative measures can effectively reduce the prevalence and severity of asthma?	78%
Organisation	What is the role of mobile technology, web resources and remote consultations in the management of patients in primary care?	78%
Organisation	How can services be configured to ensure that frontline clinical staff assess and manage acute asthma attacks according to evidence-based practice?	74%
Co-morbidity	How do co-morbidities impact on asthma control and management?	74%
Diagnosis	Is it possible to predict persisting asthma in children with wheeze in primary care?	74%
Self-management	What are the appropriate elements of self-management education and how can it best be conveyed to the patient/family in routine practice?	74%
Diagnosis	What are the reliability, validity and feasibility of different diagnostic tools such as spirometry, peak flow measurement, challenge tests, exhaled nitric oxide, and allergy testing in the diagnosis of asthma in primary care?	74%
Pharmacological	How do ICS and LTRAs compare with regard to effectiveness and side-effects in patients with mild and moderate asthma in real-life primary care practice?	70%
Self-management	How, and to what degree, are asthma action plans implemented in various communities, especially in low and middle income countries, and how do they impact on asthma morbidity and mortality?	70%
Management	What is the most cost-effective approach to inhaler devices?	70%
Self-management	Why do patients accept suboptimal asthma control and how can we address the reasons?	70%
Organisation	What are the indications for referral to an emergency unit?	65%
Management	What is the impact of different treatments for wheezing in young children in primary care?	65%
Management	What is the impact of non-pharmacological strategies (e.g. breathing modification, allergen avoidance techniques) in the management of asthma symptoms?	65%
Diversity	What is the influence of cultural and ethnic beliefs towards asthma and how do these beliefs affect outcome in management of asthma in these communities?	65%
Diversity	What strategies are needed to counteract the taboos associated with inhaler usage in some countries?	65%
CPD	Are primary care physicians aware of the allergens and respiratory irritants in their area? Are they aware of the preventive measures against such asthma triggers?	26%
Assessment	Can specific asthma phenotypes be identified in primary care and what are the implications for treatment and management in primary care?	26%
Further tests	What are the cut-off values for abnormal spirometry (lower limit of normal), reversibility tests and diurnal variation of peak flow measurement across a broad range of age groups and ethnicity?	26%
Diagnosis	What is the reliability of a medication trial for diagnosing asthma in different ages, how should such tests be performed, using which treatments and for how long?	22%
Diversity	How might asthma action plans be tailored for different cultural and ethnic groups taking into account their own cultural beliefs and practices?	17%
Diagnosis	What strategies will improve detection and prevention of occupational asthma in primary care?	17%
Self-management	How should action plans accommodate the different asthma treatment schedules?	9%
Assessment	What is the role of nitric oxide, mannitol challenge testing (or other innovative techniques) in the monitoring of asthma in primary care?	4%

Appendix 2. Research questions in allergic rhinitis which did not reach 80% consensus threshold		
Category	Research question	Agreement
Co-morbidity	How should patients with other respiratory conditions (eg asthma, COPD, sleep apnoea), or other co-morbidities (e.g. hypertension, diabetes mellitus, heart disease, liver disease) or physiological states (e.g. pregnancy, extremes of age) be managed?	78%
Diagnosis	What are the essential components of physical examination in primary care?	78%
Diversity	What is the cost-effectiveness of different treatment regimens in healthcare systems with diverse socio-economic and financial status?	78%
CPD	What is the current state of knowledge about the diagnosis and management of rhinitis in primary care?	78%
Self-management	Are patients information needs being met, with accurate, easily accessible, and culturally sensitive resources?	74%
Epidemiology	What is the hidden burden of undiagnosed allergic rhinitis in different countries?	70%
Self-management	What strategies can be used to reduce the risk of side-effects from self-treatment?	70%
Pharmacological	What evidence is there for the safety and efficacy of systemic steroids in the treatment of rhinitis? Are there differences between existing systemic therapies (e.g. oral, intramuscular?)	61%
Pharmacological	For which patients is immunotherapy (sublingual or injection) appropriate, safe and cost effective? Should such treatment always involve a referral for a specialist care?	27%
Diversity	What is the availability of over-the-counter remedies in different countries, and the diagnostic and management skills of those who sell or advise on their administration?	26%
Diagnosis	What is the value of, and how feasible are skin-prick tests and other tests in the diagnosis and management of allergic rhinitis in primary care in diverse healthcare settings? Does performance of these tests affect clinical outcomes?	26%
Management	What is the acceptability to patients and impact on the morbidity of rhinitis / asthma of physical measures (e.g.nasal douches, nasal lubricants, closing windows at night)	13%
Self-management	What non pharmacological remedies do patients use to treat their rhinitis?	13%
Self-management	To what extent do patients with allergic rhinitis use alternative medicines? (e.g. homeopathy, herbal treatment etc)?	9%
Organisation	What is the optimal balance between generalist care and specialist allergy care in different healthcare systems?	9%
Assessment	What role does allergen identification and avoidance have in the management of rhinitis? Does this vary according to the geographic, climatic and demographic context?	9%
Further tests	Does nitric oxide measurement have a role in the diagnosis and management of patients with allergic rhinitis in primary care?	4%

Appendix 3. Research questions in COPD which did not reach 80% consensus threshold		
Category	Research question	Agreement
Co-morbidity	To what extent do primary care clinicians screen people with COPD for depression using appropriate validated screening tools?	78%
Organisation	How can clinical services be organised within different healthcare systems to support self-care?	74%
Further tests	Should a chest x-ray always be done as part of an initial assessment, regardless of the severity of COPD at diagnosis?	70%
Management	What is the impact (e.g on smoking cessation rates, identification of COPD) of routinely undertaking spirometry in smoking cessation consultations?	70%
Diagnosis	Is it best to use a fixed ratio or LLN of FEV1/FVC? What are the characteristics of patients in the community who are diagnosed with COPD according to the fixed ratio formula and not according to the LLN?	68%
Prevention	What impact does screening for and taking action (pharmacological and/or physical activity) to prevent osteoporosis/fractures have on morbidity?	61%
Organisation	What are the core requirements for a community based pulmonary rehabilitation service?	57%
Organisation	How can carers and family members be supported?	30%
Prevention	What is the impact of locally tailored community-level measures to decrease exposure to indoor smoke and reduce harm?	30%
Organisation	What is the role of tele-monitoring? Does it reduce admissions and/or improve the quality of life for people with COPD? For which patients, and under what circumstances does it work best?	26%
Organisation	What are the social care needs? Is it possible to integrate social and clinical care?	22%
Organisation	What organisational approaches (e.g. primary care registers, public health campaigns) are most effective in facilitating good uptake of seasonal flu vaccination?	22%
Organisation	How can health and social care services be developed to meet the needs of people with severe COPD within different cultural and healthcare systems?	17%
CPD	How can primary care clinicians overcome the 'paralysis' that results from the uncertain prognosis in order to deliver proactive supportive care?	13%
Organisation	What is the role of the voluntary sector? How can the public profile of COPD be raised?	13%
CPD	What professional skills are required by clinical teams providing integrated care for people with COPD within diverse healthcare systems?	13%

Appendix 4. Research questions in tobacco dependence which did not reach 80% consensus threshold		
Category	Research question	Agreement
Management	What psychosocial factors (family, alcoholism, depression etc) affect ability to quit and how may these be overcome?	78
CPD	How can awareness of the public health importance of tobacco dependence – both among smokers and the primary care professionals – be raised?	74
Management	What is the impact of regular and non-judgmental advice to quit on long-term quit rates?	74
Compliance	What strategies improve adherence with pharmacotherapeutic agents for smoking cessation?	74
Prevention	What is the impact of primary care interventions on exposure of children to environmental tobacco smoke and prevention of smoking in young people?	70
Organisation	What factors increase the uptake and effectiveness of telephone (and internet) quitline services and how may they be optimised?	65
Pharmacological	What is the clinical and cost effectiveness of nicotine vaccines in assisting smoking cessation and what is their role in primary care populations?	30

Appendix 5. Research questions in respiratory infections which did not reach 80% consensus threshold		
Category	Research question	Agreement
Management	Do primary care clinicians follow guidelines such as British Thoracic Society CAP guideline or SIGN LTRI guideline in their daily practice?	78%
Pharmacological	If antibiotics are used, what are appropriate first-line choices and to what extent do local factors determine antibiotic choice?	78%
Further tests	What investigations for respiratory infections are available in primary care in different countries (eg x-ray, leucocyte count, C reactive protein, erythrocyte sedimentation rate) and how does the use of these ancillary tests affect antibiotic use and clinical outcomes in these countries?	78%
Self-management	Can the use of patient education and information strategies improve patient satisfaction and reduce inappropriate antibiotic use?	74%
Organisation	What is the role of primary care in pandemic respiratory infections?	74%
Management	Can deferred prescription strategies reduce antibiotic use without compromising outcomes?	70%
Prevention	How can uptake rates for vaccination be improved?	70%
Prevention	Is there a role for primary care in smoking cessation, nutritional and other preventative programmes to reduce LRTIs in the community?	61%
Prevention	What are the most effective strategies for prevention and reduction of transmission of LRTIs?	39%
Pharmacological	How should antivirals be used in primary healthcare?	30%
Compliance	What is the compliance (adherence and persistence) with different antibiotic treatment regimens? In healthcare systems which allow patients to obtain antibiotics over-the-counter, what is the effect on compliance, on outcomes and on resistance rates? To what extent do people use antibiotic 'left-overs' in the community?	26%
Management	What is the role of over-the-counter and non-pharmacological therapies in the management of the symptoms of LRTI?	22%
Management	Do primary care clinicians consider the cost of medications to the patient, and does cost and availability of medication affect outcomes?	17%
Diversity	Should treatment approaches to LRTI be the same in high, middle and low income countries?	17%
Organisation	What determines how long patients wait (delay?) before consulting with their GP?	13%
Further tests	Is it warranted and feasible to use virology testing in primary care?	9%

LRTI=lower respiratory tract infections.