quantitative approach proposed by Frey and coworkers may be extended and applied also to fluctuations of clinical symptoms, biomarkers, medication use and other endpoints used to monitor asthma.

Before lung function history indices can be implemented in our everyday clinical practice, more studies are required to improve the understanding of this new tool. For example, can the same measures of lung function history be applied to patients with asthma of different severity? The present study by Thamrin et al\(^5\) represents the first attempt to approach this issue and, as mentioned, the data suggest that different indices may be needed in severe asthma than in milder to moderate asthma. However, the present study does not allow us to draw final conclusions on this issue. The studies of mild to moderate and severe asthma were made on two sets of data originating from two very different studies performed about 10 years apart and, as the authors point out, one limitation with the older study was that it did not use electronic diaries. Different inclusion criteria, different settings and a different course of the two trials also make the direct comparison of the two trials difficult. There is therefore a need for confirmatory studies in well-pheno-typed and coherent cohorts of patients with asthma of different severity and identical study protocols. It would be an added benefit if several biomarkers were determined repeatedly over a long time period in parallel with lung function data, symptoms and medication use. This would allow similar calculations of the history of biomarkers, symptoms and other outcomes, possibly adding information about the pathophysiology of asthma.

Considered together, the study of Thamrin et al\(^5\) raises excitement of future improvements both in clinical practice and mechanistic research. It seems that fluctuation analysis of data from handheld electronic spirometers should be a valuable new application to add to smartphones. This would make it possible to assess the value of lung function history measurements in research and also in ordinary clinical follow-up. For research, lung function fluctuation analysis may represent an important new variable which, when integrated with other clinical and biological (genomic, transcriptomic, proteomic and metabolomic) data, may allow for better classification and phenotyping of asthma by the use of mathematical modelling in a systems biology approach.\(^5\) Such a better understanding of the pathology of asthma—especially of severe, poorly-controlled or difficult-to-treat cases\(^5\)—may facilitate development of new diagnostic methods and improve asthma care. Moreover, identification of key nodes in the complex network of inflammatory processes underlying asthma may result in discovery of new targets for effective therapeautic intervention.

**Competing interests** None
56% of patients with COPD had undergone spirometry as recommended by guidelines and only 34% received guideline-concordant treatment.6 Given that COPD will become the third leading cause of death by 20307 and represents the one common cause of death for which mortality rates continue to climb, we must improve adherence to evidence-based aspects of COPD management.8

ADDRESSING QUALITY PROBLEMS
Quality improvement (QI) is a science9 and includes numerous distinct strategies for changing patient and provider behaviour, as well as redesigning systems of care—audit and feedback, case management, support for self-management, patient registries and computerised decision support to name just a few.10–12 But, the single most basic approach involves iterative cycles of outcome measurement, identification of problems, implementation of potential solutions and repeated measurement.13

The positive impact of such cycles of continuous QI in pulmonary medicine has been nowhere as evident as under the direction of the American Cystic Fibrosis Foundation Patient Registry and its Therapeutic Development Network. In this issue, Drs Quon and Goss provide a review of the huge impacts these initiatives have had on the lives of patients with cystic fibrosis.14 The overriding principle has been transparency, with all participating centres committed to reporting their results to clinicians and patients.

The American Cystic Fibrosis Foundation Patient Registry has evolved over 45 years from a few basic measures of the natural history of disease to over 300 variables for some 26000 patients, detailing aspects of management, pulmonary functional status, laboratory data and clinical outcomes, as well patients’ (or their parents’) assessments of the quality of care received. This engagement in transparently measuring and improving care has been associated with continued improvements in outcomes, including an increase in life expectancy from 27 years in 1989 to 36 years in 2009.14

CHALLENGES IN REPORTING IMPROVEMENT EFFORTS
We urgently need much more successful improvement initiatives in pulmonary medicine. That said, reporting the methods and results of QI initiatives differs in important ways from reports of traditional clinical research. QI reports tend to address messier problems, involve more complex interventions and require far greater attention to context (table 1).

The ‘messiness’ of problems in QI reflects their broader scope and focus on routine care, rather than the idealised setting of a clinical trial. For instance, a clinical trial might address the question: Does such-and-such drug improve the following specific clinical outcome for patients with COPD? An improvement project, by contrast, might ask: Can we improve outcomes for patients with COPD by reorganising our referral and scheduling processes to ensure timely access and better coordination between specialists and general practitioners? This example illustrates not just the ‘messiness’ problem, but also the intrinsic complexity of the interventions. When reporting a clinical trial, the intervention typically requires scant description because its components are well understood: a drug with known ingredients, administered according to a specified regimen, with such-and-such processes related to follow-up assessment. By contrast, reporting changes to a clinic’s referral and scheduling processes requires detailed description, because none of the changes involve ubiquitous or well-understood ingredients and actions.

Messy as the problems of QI are and complex as the associated interventions can be, the crucial role of context in reporting and interpreting improvement initiatives adds a unique dimension that has received increasing attention.15 Potentially relevant contextual factors include external environmental influences (eg, regulatory requirements, payment systems, media attention) and numerous organisational features, such as resources, technologies, staffing, institutional culture and baseline quality, among others.

In interpreting a clinical trial, we do not need to know the psychological or institutional motivations that gave rise to the trial. ‘(My father suffered with COPD for many years and the head of my department encouraged me to focus on this promising new drug.)’ We do not require such details because, except in the case of commercial interests, they have no bearing on the conduct or interpretation of the research. With QI, however, stating that ‘our hospital undertook this initiative after media reports of poor outcomes’ and ‘the president of the hospital championed this improvement project’ suggests factors that may have directly affected the project’s success—staff motivation, executive support for necessary policy changes and provision of resources.

<table>
<thead>
<tr>
<th>Table 1 Challenges that distinguish quality improvement (QI) from traditional clinical research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Typical clinical research</strong></td>
</tr>
<tr>
<td>’Messier problems’ in QI</td>
</tr>
<tr>
<td>Outcomes and goals less well defined, settings less controlled</td>
</tr>
<tr>
<td>Complex interventions</td>
</tr>
<tr>
<td>QI interventions require much more description to understand and to permit replication</td>
</tr>
<tr>
<td>Who performed what functions in the multidisciplinary team?</td>
</tr>
<tr>
<td>What were the ‘project champions’ and how were they selected?</td>
</tr>
<tr>
<td>Context plays a crucial role What motivated the intervention?</td>
</tr>
<tr>
<td>What institutional features provided direct or indirect support for the intervention?</td>
</tr>
<tr>
<td>What internal and external incentives might have affected the behaviours of participating clinicians and patients?</td>
</tr>
</tbody>
</table>
The general issues illustrated in Table 1 encompass numerous specific factors potentially relevant to the interpretation of QI research. The SQUIRE (Standards for QUality Improvement Reporting Excellence) statement provides a checklist of 19 items that authors should consider when reporting QI studies. Most items are common to all scientific reporting, but many have been modified to reflect the unique nature of improvement work. For instance, the Introduction should include not just a description of relevant background literature but also an explicit description of the local problem that gave rise to the initiative. And the Methods should include not just the usual sections on study design, outcomes of interest and analytic methods, but also describe planning and implementation of the intervention (eg, why specific components were chosen, how they were expected to work).

The importance of this SQUIRE framework can be seen when applied to the published report of a single centre’s experience to improve clinician adherence to best practice guidelines for asthma and COPD. The intervention consisted of the published report of a single centre’s experience to improve clinician adherence to best practice guidelines for asthma and COPD.17 The intervention consisted of components chosen, how they were expected to work).

Like the CONSORT statement for the reporting of randomised trials,18 the goal of SQUIRE lies not just in improved reporting, but also in improved design. One would not want clinical trialists to find out about concealed allocation and blinding only at the stage of consulting CONSORT to write up their results. Similarly, recognising the importance of issues covered in SQUIRE will enhance the success of QI research, not just its publication. For instance, the exhortation to report details such as collaboration with major patient advocacy groups and the focus on transparent, detailed reporting of outcomes, as occurred with initiatives in cystic fibrosis,14 also suggests the importance of considering such features in other QI initiatives for chronic illnesses (eg, COPD, diabetes, congestive heart failure, asthma). These specific components may not prove essential in all cases, but the general model followed in cystic fibrosis should serve as a call to arms for others to improve patient care and SQUIRE provides a framework for enhancing both the rigour and the reporting of all such efforts.

Competing interests None.

Provenance and peer review Commissioned; internally peer reviewed.

Published Online First 19 August 2011


REFERENCES

The challenges of quality improvement reports and the urgent need for more of them

Kieran McIntyre and Kaveh G Shojania

Thorax 2011 66: 1020-1022 originally published online August 19, 2011
doi: 10.1136/thoraxjnl-2011-200853

Updated information and services can be found at:
http://thorax.bmj.com/content/66/12/1020

These include:

References

This article cites 15 articles, 7 of which you can access for free at:
http://thorax.bmj.com/content/66/12/1020#BIBL

Email alerting service

Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections

Articles on similar topics can be found in the following collections

Cystic fibrosis (525)
Asthma (1782)
Quality improvement (27)
Drugs: infectious diseases (968)
Drugs: respiratory system (526)
Epidemiologic studies (1829)
Influenza (106)
TB and other respiratory infections (1273)
Vaccination / immunisation (158)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/