COPD and death

COPD and death: what exactly is the relationship?

Michael Rudolf

It's time to take stock of what we do and do not know about what patients with COPD actually die from

The categorisation of different causes of death in patients with chronic obstructive pulmonary disease (COPD) has not usually been regarded as an important topic, but with all-cause mortality and cause-specific mortality now being used as outcome measures in large multicentre clinical trials,[1 2] it is perhaps time to take stock of what we do and do not know about what patients with COPD actually die from. A number of studies that have addressed this issue over the years have, not surprisingly, found varying proportions of deaths ascribed to respiratory causes, lung cancer and cardiovascular disease (the three principal categories), with the results of any one study being highly dependent on both the source (and accuracy) of patient information and on the severity of underlying disease.[3–7]

The past year has witnessed a flurry of papers and editorials covering a number of widely different aspects of mortality in COPD, with topics ranging from the confidence we can have in interpreting mortality data,[8] the possible role of inhaled corticosteroids on cardiovascular mortality in COPD[9 10] and the relationship of inpatient mortality to hospital resources and staffing levels[11] to whether or not sex influences survival.[12 13] Over the past few years there has also been a growing realisation that we need to rethink the traditional outcome measures (especially those based on conventional lung function) in clinical trials of COPD and—perhaps learning from the experience of our cardiology colleagues in their clinical studies in cardiovascular disease—accept the need for large prospective trials based on hard clinical outcomes such as death.[14] The TORCH (Towards a Revolution in COPD Health) trial[1] was the first major long-term study in COPD that took all-cause mortality as its primary outcome measure, and in this issue of *Thorax* McGarvey *et al*[15] report on the activity of the Clinical Endpoint Committee (CEC) that was charged with categorising the cause of death and its relationship to COPD in patients who died during the course of the study (***see p 411***).

The importance of this paper is that it describes, for the first time, the methodology which members of the CEC used in adjudicating on specific causes of death, and the members of the committee are to be congratulated on reaching an agreed consensus in every single case. The reliability of these categorisations was assessed by blindly re-adjudicating 11% of the cases: identical categorisation was found in 83%. One of the issues which raised particular problems for the committee, and which was the cause of several of these discordances on re-adjudication, was the difficulty in distinguishing between COPD exacerbation and pneumonia as causes of death. As a result of this, one of the helpful recommendations to emerge from the paper is that future studies of COPD mortality should re-examine how best to classify COPD exacerbations that occur in the setting of pneumonia.

Another problem highlighted by the authors was the difficulty in defining cardiovascular deaths: whether ''sudden death'' should always be regarded as cardiac in origin and whether some true cardiovascular deaths might have been misattributed to respiratory causes. This is not just of academic interest, but is particularly relevant in the light of our developing understanding of the complex interrelationships between cardiovascular and COPD mortalities; the possible beneficial role of inhaled steroids on cardiovascular mortality in COPD (already alluded to earlier),[10] the relationship between reduced forced expiratory volume in 1 s and death from ischaemic heart disease,[16 17] the role of systemic inflammatory mediators (such as C-reactive protein) in increasing the risk of cardiac death in patients with COPD[18] and, more recently, the suggestion that statin usage might be associated with reduced mortality in COPD.[19] Never has it been more relevant to try and obtain a clearer picture of precisely what our patients with COPD are actually dying from.

The authors also describe in great detail how they attempted to differentiate between deaths that could definitely be attributed to COPD regardless of the specific final fatal event, and deaths that were only ''related'' to COPD, defined as illnesses which would probably not have been fatal had COPD not been present. Using these definitions, 27% of all deaths were ascribed as being directly due to COPD and, overall, 40% of the deaths were judged to be definitely or probably related to COPD.

Agreeing a consistent approach to classifying the cause of death is not just a question of semantics. Different strategies to decrease mortality in COPD will depend crucially on which particular putative causation is being targeted: exacerbation frequency, development of pneumonia or prevention/control of cardiovascular comorbidities. In emphasising how important it is not to confuse the cause of death (cardiac vs non-cardiac vs all-cause) in cardiovascular studies, Lauer *et al*[20] quoted Miss Buttercup from Gilbert and Sullivan's *HMS Pinafore*: ''Things are seldom what they seem; skim milk masquerades as cream''. In reporting mortality statistics in any future large long-term studies of COPD (and perhaps these should now certainly include a prospective trial of statins!), perhaps the more appropriate literary quotation to bear in mind when defining and classifying the causes of death in COPD is that from Humpty Dumpty in Lewis Carroll's *Alice Through the Looking Glass*: ''When I use a word, it means just what I choose it to mean—neither more nor less.''.

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Abbreviated monitoring for diagnosis of SDB

Abbreviated or not abbreviated? Is it the right question?

Frederic Sériès

The use of abbreviated recording techniques in the diagnosis of sleep-disordered breathing

Sleep-disordered breathing (SDB) disturbances are very prevalent in developed countries. Since it was estimated over 10 years ago, the prevalence of SDB is probably higher now because of the dramatic increase in body weight in the populations of these countries.[1] Given the large increase in mortality and morbidity outcomes associated with the diagnosis of SDB, the diagnosis of a nocturnal breathing disorder should no longer be confirmed solely by conventional in-laboratory polysomnographic recordings. This justifies the need for abbreviated monitoring during sleep to be part of the assessment of SDB and the tremendous effort developed by the sleep research community to evaluate the diagnostic value of abbreviated recordings.

The study by Jobin *et al*[2] reported in this issue of *Thorax* (***see p 422***) is the first comparative study that does not use in-laboratory polysomnographic recordings as the gold standard, and is thus an important step towards evaluating the merits of abbreviated recording techniques. This is a major upheaval in the field of sleep medicine, and opens the way to realistic assessments of abbreviated recording techniques in real-life conditions that avoid costly, time-consuming in-laboratory polysomnographic recordings. It is, however, reasonable to wonder whether the authors should have proceeded more cautiously by starting with level 2 monitoring techniques (ie, an unattended complete polysomnographic study) as a reference, which would allow the influence of home monitoring on cardiorespiratory variables to be evaluated while, at the same time, taking potential differences in sleep characteristics into consideration. The authors did not explain why electrophysiological variables, which can be recorded using the Suzanne apparatus, were not collected. At a minimum, the reference portable monitoring technique should be designed to interfere minimally with sleep quality. The level 3 device used by Jobin *et al* may not fully meet these requirements due to the cumbersome equipment, but the latest generation of recording systems should correct these potential pitfalls.

Despite the tremendous interest in the use of abbreviated monitoring by the medical community, American medical societies (APSS, ACCP, ATS) have, until recently, maintained that portable monitoring devices are not accurate enough to be used in an ambulatory setting for the management of SDB.[3] A number of reasons may account for the discrepancy between the official recommendations of medical societies and the widespread use of abbreviated monitoring by the medical sleep community (apart from the potential impact of differences in reimbursement rules in certain countries). One is the very large disparity in the recorded signals and in the recording and signal processing techniques of the devices that have been tested (such as oximetry, breathing sounds, sophisticated cardiac rhythm analysis (heart rate variability), respiratory impedance signals, pulse transit time, arterial tonometry). In this regard, night-time oximetry recordings remain the most extensively investigated technique, and it is somewhat paradoxical that a typical desaturation/resaturation profile per se may not be considered as a diagnostic finding given that a repetitive fall in arterial oxygen saturation (Sao_2) is recognised as a cornerstone of the capacity of sleep recordings to identify SDB[4] and that the accuracy of Sao_2 recording techniques (probes, software analysis including artefact deletion, sampling frequency, averaging time, signal processing) has dramatically improved in recent years.

The discrepancies in the diagnostic performance of oximetry recording techniques reflect the specificity of the data obtained with a given recording system, but also indicate the need to have access to, and to examine, raw data to satisfactorily interpret abbreviated recordings. Considering that ''oximetry'' refers to a wide variety of different techniques with different diagnostic performances,[5] the term ''oximetry'' is meaningless when used to designate an investigation category. The work of Jobin *et al* illustrates this point since the desaturation profiles of the two oximeters they tested were different. Expertise with portable monitoring thus has to be developed in each sleep centre and should take into account the usefulness and limits of portable monitoring devices in the investigation strategy for individual patients.