Telemonitoring and Intermediate Care

To the Editor:

COPD is a progressive disease responsible for significant morbidity and mortality.1 In recent years, intermediate care has been developed by secondary and primary health professionals to provide a seamless approach to the delivery of intersectoral patient care.2 The intermediate model of care improves choice for patients and aims to reduce morbidity from COPD exacerbations through community-based interventions, such as hospital at home and early supported discharge schemes.3 Exacerbations of COPD have been linked with frequent emergency attendances,4 hospitalization,4 and a reduction in quality of life5 and lung function,6 and patients who experience an exacerbation may benefit from an intermediate model of care.7

The monitoring of intermediate care patients has recently gained prominence with the advent of health technology.7 We defined telemonitoring within intermediate care as the daily use of health technology by clinical staff at a health-care facility to remotely monitor a patient’s progress. The ability to have surveillance of the patient’s clinical data while the patient is at home is proving to be of interest to clinicians and commissioners of services.8 However, telemonitoring in the intermediate care patient population may provide information that previously proved to be elusive to capture and could contribute to a central hub of clinical decision making.

We recently reviewed more than 1,000 articles and were able to identify a very small number of high-quality studies (Table 1) that have attempted to use telemonitoring as an adjunct clinical tool within intermediate care alongside or as a comparison with “best” guideline-based practice. Many studies that we reviewed simply described the technology. Our primary outcome measures were hospital readmission rates, length of stay, unscheduled health care, and exacerbations at home, and secondary outcomes were changes in health behavior and quality of life. Our review found a lack of telemonitoring homogeneity because of the different technologies used in these studies and the fact that many studies reported high attrition rates. Of particular interest, some studies reduced readmission rates and length of stay; however, these improvements were not mirrored in positive changes in quality-of-life scores. Although it appears that several studies did seem to show a change in the number of unscheduled care events, the differing types of technology used, their monitoring schedules, patient populations, and the lack of a guideline-based best practice comparator according to the intermediate care guideline brings a challenge to the clinical interpretation of these results. It has been previously noted that intermediate care may not be a suitable option for 75% of patients with COPD presenting to hospitals for assessment of an exacerbation,13 and technology reduces this potential number of patients further. On completing this review, we find it difficult to recommend to commissioners the addition of this technology to intermediate care and see the need for better quality studies in the future that can establish a clear role for telemonitoring as an adjunct to intermediate care.

### Table 1—Characteristics of Studies Included in the Final Analysis

<table>
<thead>
<tr>
<th>Study/Year</th>
<th>Population</th>
<th>Technology</th>
<th>Length of Time Patients Use Equipment</th>
<th>Reported Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maiolo et al2003</td>
<td>Severe respiratory failure (COPD and restrictive disease) that required LTOT. Comparator: face-to-face outpatient visits at 3-month intervals</td>
<td>Pulse oximeter with modem for oxygen saturation readings twice a week in addition to three monthly visits to hospital clinic</td>
<td>12 mo</td>
<td>Readmissions, exacerbations at home</td>
</tr>
<tr>
<td>Whitton and Mickus2007</td>
<td>COPD/CHF posthospital. Comparator: traditional face-to-face home visits</td>
<td>Video visits once a week with technological peripherals for vital sign monitoring along with usual care</td>
<td>Reported as mean length of time 10.7 wk</td>
<td>SF-36 scores, qualitative interviews, Outcome and Assessment Information Set</td>
</tr>
<tr>
<td>Trappenburg et al2008</td>
<td>COPD with at least one exacerbation in previous year. Comparator: usual care, outpatient and GP appointments</td>
<td>Vital signs, symptoms, medication compliance, disease information via technology; nurse viewed data Monday to Friday</td>
<td>6 mo</td>
<td>HRQoL, readmissions, exacerbations at home, length of stay, unscheduled care, type and quantity of medication prescribed</td>
</tr>
<tr>
<td>Vitacca et al2009</td>
<td>Chronic respiratory failure on oxygen or home ventilation. Comparator: usual care, outpatient visits at 3-month intervals.</td>
<td>24-h on-call service and pulse oximetry with modem; nurse viewed data Monday to Friday</td>
<td>12 mo</td>
<td>Readmissions, exacerbations at home, cost-effectiveness</td>
</tr>
</tbody>
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CHF = congestive heart failure; GP = general practitioner; HRQoL = health-related quality of life; LTOT = long-term oxygen therapy; SF-36 = short-form 36 health survey questionnaire.

*aReadmission indicates patients were hospitalized.

*bUnscheduled care may be ED attendance, emergency GP visits, or other unexpected health service use.
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