two patients had 1 positive marker, 36 had 2, and 44 had 3. A total of 176 patients were immediately transported to hospital (4 refused). Of these, 90 (51%) were discharged with the hospital record–determined diagnosis of acute myocardial infarction (AMI). One-fifth of the remaining 641 patients (126 of 641) were reexamined within the 3-day follow-up because of continuing complaints, and another 15 AMIs were diagnosed. The sensitivity, specificity, and positive and negative predictive values were 86.6%, 83.3%, 53.8%, and 97.6%, respectively.

The overall mortality rate for the study population was 3.3% (27 patients). Mortality among patients with a negative kit result was 3% (19 patients) during the 3 days of follow-up (4 from cardiogenic shock, 2 from sudden cardiac death with failed resuscitation, and 13 from unrelated causes). Of 180 patients, 8 (4.4%) with a positive kit result died from sequelae of an AMI (7 underwent cardiogenic shock and 1 had a post-AMI stroke).

Comment. Elevation of cardiac markers in individuals in whom an AMI is not diagnosed in the end is well known,5,6 and this finding characterized 50% of our patients in whom the uncertainty was clarified by appropriately extended evaluations in the emergency services. Ninety AMI cases (9.1%) were identified but would probably have been missed because of the patients’ inconclusive clinical and ECG presentations. Positive test results alone determined their transport to hospital, sparing them possible serious untoward consequences.

Than et al7 recently reported satisfactory results in ruling out an AMI by following a protocol in which the same cardiac markers were measured twice in patients with early (<6 hours) symptom onset and who had already arrived to the emergency department. We needed to test those markers only once and could do so at the point of care, thus safely obviating unnecessary trips to the emergency department. Importantly, 6 hours or more from symptom onset, the 98% negative predictive value of assessment by cardiac markers provides further support to the physician at the point of care in the decision-making process, which is sometimes daunting when the source of the pain is inconclusive.

Eran Leshem-Rubinow, MD, MHA
Yigal Abramowitz, MD
Nomi Malov, RN
Maor Hadad
Mira Tamari, RN
Michal Golovner, MD
Arie Roth, MD

Author Affiliations: Departments of Internal Medicine “E” (Dr Leshem-Rubinow) and Cardiology (Drs Abramowitz and Roth), Tel-Aviv Sourasky Medical Center (affiliated with the Sackler Faculty of Medicine, Tel Aviv University), and SHL Telemedicine (Mss Malov, Hadad, and Tamari and Dr Golovner), Tel Aviv, Israel.

Correspondence: Dr Leshem-Rubinow, Department of Internal Medicine, Tel Aviv Sourasky Medical Center, 6 Weizman St, Tel Aviv 64239, Israel (drl.eranleshem@gmail.com).

Author Contributions: Drs Leshem-Rubinow, Abramowitz, Golovner, and Roth had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Leshem-Rubinow, Abramowitz, Malov, Golovner, and Roth. Acquisition of data: Leshem-Rubinow, Abramowitz, Malov, and Roth. Analysis and interpretation of data: Leshem-Rubinow, Abramowitz, Hadad, Tamari, Golovner, and Roth. Drafting of the manuscript: Leshem-Rubinow, Abramowitz, Malov, Tamari, Golovner, and Roth. Critical revision of the manuscript for important intellectual content: Leshem-Rubinow, Hadad, and Roth. Statistical analysis: Leshem-Rubinow, Abramowitz, and Roth. Administrative, technical, and material support: Leshem-Rubinow, Abramowitz, Malov, Hadad, Tamari, Golovner, and Roth. Study supervision: Leshem-Rubinow and Roth.

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Prevalence and Characteristics of Outpatient Palliative Care Services in California

Outpatient palliative care services (PCSs) offer the opportunity to intervene earlier in the disease trajectory and result in improved patient outcomes.1-2 Outpatient PCSs can provide improved continuity of care, reduce unnecessary rehospitalizations, and address the needs of patients and caregivers.3 While the potential benefits of outpatient PCSs are increasingly recognized, there is a paucity of information regarding the structure of outpatient PCSs,4 and, to our knowledge, there are...
no studies reporting the prevalence and characteristics of existing services. Therefore, the aim of this research is to describe the prevalence and characteristics of outpatient PCSs associated with California hospitals to enhance our understanding of how outpatient PCSs are delivered and inform their growth and development.

Methods. Descriptions of the study methods have been previously reported.3 We surveyed the leaders of palliative care (PC) programs in all 351 acute care hospitals in California regarding the presence and characteristics of PCSs. The National Health Foundation (NHF) administered the survey. We asked about hospital characteristics including bed size, system affiliation, ownership, and whether it serves as a teaching site. We assessed presence of an outpatient PCS, defined as an outpatient service focused on addressing physical, intellectual, emotional, social, and spiritual needs of patients and family. We also asked when the outpatient PCS was founded, how many patients were seen in the previous year, and their diagnoses. We calculated staffing levels for outpatient PCSs by summing the full-time equivalent (FTE) reported for advanced practice nurse, registered nurse, physician, social worker, and chaplain. We examined the association between hospital characteristics and the presence of outpatient PCS using x² or analysis of variance as appropriate.

Results. Of 351 acute care hospitals in California, 324 responded (92%) and 27 (8%) reported having outpatient PCSs. Hospitals with an outpatient PCS were larger and more likely to have an inpatient PCS, be owned by a nonprofit organization, be a teaching site, and have a system affiliation compared with hospitals without an outpatient PCS (Table).

The mean (SD) outpatient PCS program age was 3 (2.5) years (range, 1-9 years), with half (46%) being established in the previous 12 months. Of hospitals that reported program age, 50% (n = 12) of outpatient PCSs were established in the same year as the hospital’s inpatient service and only 13% (n = 3) pre-dated their inpatient counterpart. The mean (SD) number of new patients seen by outpatient PCSs in 2007 was 197 (190) (range, 5-670), half the number seen by the corresponding inpatient PCS (n = 347).

More than half of patients seen by outpatient PCSs had a primary diagnosis of cancer (55%), with 3 services seeing only patients with cancer. Other common patient diagnoses included cardiac conditions (22%), dementia (14%), pulmonary conditions (10%), and neurological conditions (7%).

Staffing at the 20 sites that reported data reveals that the mean (SD) FTE of all disciplines devoted to outpatient PCSs was 1.4 (1.2) (range, 0.4-4.6) compared with 2.0 (1.2) (range, 0.3-4.7) for inpatient PCSs. The largest proportion of outpatient FTE is devoted to registered nurses (0.9) and advance practice nurses (0.7). The physician FTE for outpatient PCSs was 0.3, half of that for inpatient PCSs (0.7); however, inpatient services see almost twice as many patients. Outpatient PCSs have a similar social work component (0.8) to inpatient programs (0.7).

Comment. Outpatient PCSs are rare compared with inpatient services and most are new. Most outpatient PCSs in California have been established within the last 4 years and half within the previous year, which may indicate a commitment to growth in this area consistent with recent evidence that demonstrates that outpatient PCSs improve patient outcomes.

Consistent with national guidelines,6 outpatient PCSs are typically interdisciplinary, with nurses acting as core care providers. Interestingly, outpatient PCSs are proportionally better staffed than their inpatient counterparts (70% as much staffing for 50% as many patients).

Providing long-term follow-up in the clinic setting may account for this difference, though our data do not provide a definite explanation.

Compared with 11 leading outpatient PCSs surveyed in a prior study,5 those in our sample see fewer than half as many patients per year (197 vs 501), see a wider range of diagnoses (55% vs 80% cancer), and have fewer FTEs (0.7 vs 0.9 for advance practice nurses; 0.9 vs 1.6 for registered nurses; and 0.3 vs 0.6 for physicians), demonstrating the need to benchmark to similar services.

Demonstrated improvements in care will likely drive demand for outpatient PCSs. The presence of an existing inpatient PCS may help launch an outpatient PCS and the large number of existing inpatient PCSs may serve as a platform for building more palliative care services in the outpatient setting. Our study represents the largest population-based survey of outpatient PCSs to date, yet as more outpatient PCSs are established, research will be needed to understand the quality of care being delivered, the results achieved, the prevalence of outpatient PCSs not associated with hospitals, and the structures and processes of care that provide the best outcomes.

Table. Hospital Characteristics and the Presence of an Outpatient Palliative Care Service (PCS)

<table>
<thead>
<tr>
<th>Hospital Characteristic</th>
<th>Outpatient PCS</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (n=27)</td>
<td>No (n=297)</td>
</tr>
<tr>
<td>Bed size, mean (95% CI), No.</td>
<td>312 (227-397)</td>
<td>215 (197-233)</td>
</tr>
<tr>
<td>Inpatient PCS, No. (%) (yes=106)</td>
<td>25 (93)</td>
<td>81 (28)</td>
</tr>
<tr>
<td>Ownership, No. (%) (nonprofit=199)</td>
<td>24 (89)</td>
<td>175 (59)</td>
</tr>
<tr>
<td>Teaching site, No. (%) (yes=58)</td>
<td>9 (33)</td>
<td>49 (17)</td>
</tr>
<tr>
<td>System affiliation, No. (%) (yes=164)</td>
<td>19 (70)</td>
<td>145 (49)</td>
</tr>
</tbody>
</table>

Gabrielle N. Berger, MD
David L. O’Riordan, PhD
Kathleen Kerr, BA
Steven Z. Pantilat, MD

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Effect of Integrated Care on Advanced Chronic Obstructive Pulmonary Disease in High-Mortality Rural Areas

Guideline-based care only reaches approximately 50% of patients with chronic illnesses, including chronic obstructive pulmonary disease (COPD), suggesting that implementation strategies are flawed. Inadequate care for COPD is likely to be greatest in rural areas where access to care is limited and COPD-related mortality is high. Education and management programs have been developed to enhance patient knowledge, improve delivery of guideline-based care, and maximize early identification and treatment of exacerbations. In a small, prospective randomized clinical trial, we showed that a proactive model of integrated care (PIC) results in dramatic improvements of quality of life and effectively identifies COPD exacerbations. PIC differs from other self-management or integrated care models by combining disease-specific education and self-management principles with a simple remote monitoring platform (Health Buddy; Robert Bosch Healthcare, Palo Alto, California). We hypothesized that our novel disease management program would improve quality of life and increase guideline-based care in a predominantly rural group of patients with exceptionally high COPD-related mortality.

Methods. One hundred patients with advanced COPD were enrolled in a 12-week longitudinal, cohort study. Subjects resided in 1 of 16 Colorado counties with the highest COPD-related mortality (90-129 deaths per 100,000); well above the 2005 national average (64.3 deaths per 100,000). Fourteen counties were rural or frontier (≥6 persons per square mile). Details of the management, monitoring and educational program have been published. Assessments were made at enrollment and study completion, including quality of life as measured by the St George’s Respiratory Questionnaire (SGRQ), guideline-based therapies, BODE index (body mass index [BMI], the degree of airflow obstruction [O2] and dyspnea [D], and exercise capacity [E]), and health care utilization. Univariable analysis was performed to see which component(s) of PIC had the most impact on improvement in quality of life. Variables with P < .15 were then entered into multiple linear regression to determine independently significant factors. Finally, worsening symptoms were flagged by the Health Buddy, and the symptoms most commonly associated with an acute exacerbation were noted.

Results. Baseline characteristics for the 100 enrollees, 82 completers, and 18 noncompleters are given in eTable 1 (http://www.archinternmed.com). At baseline, subjects’ mean FEV1 was 43% predicted, and they had 53 pack-years of tobacco use; long-acting inhaler use ranged from 34% to 57%, and postexercise oxygen saturations were low at 85.5%. Of the 82 completers, 60 (73%) resided in rural counties. The Table shows that PIC improved SGRQ by 11.6 units, increased inhaled medication use by 18 to 23 percentage points, and improved oxygen use and saturations. PIC increased the 6-minute walk distance (6MWD) by 45 m, improved the BODE index by 1.14 units, and decreased COPD-related emergency department visits and hospitalizations. In addition, smoking rates tended to decrease from 24.4% to 18.3% (P = .06).

Multiple linear regression analysis (eTable 2) showed that only the initiation of a long-acting β-agonist (LABA) medication and an improvement in 6MWD showed significant effects on improvement in SGRQ (β = −10.3 [P = .03] for LABA initiation; β = −0.06 [P < .001] for 6MWD improvement). However, LABA initiation and 6MWD improvement only explained 27% of the variation in SGRQ change.

Twenty-four subjects had 31 documented COPD exacerbations. As given in eTable 3, of the 68 red and yel-