assessments of underlying data quality will improve our ability to optimally use and understand these data sources to formulate appropriate hypotheses for these data. Consumers of data and observational research derived exclusively from administrative data need to be appropriately critical. Moving forward, we need to work to foster better integration of data from the EHR into administrative data in the hopes of significantly improving data quality. ■

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"Microclimates" of Care for Hospitalized Patients with Pulmonary Disease: An Idea That Will Bear Fruit?

Patrick G. Lyons, M.D.[1], and Allan J. Walkey, M.D., M.Sc.[2,3,4]

[1]Division of Pulmonary and Critical Care Medicine, Department of Medicine, Washington University School of Medicine, St. Louis, Missouri; [2]The Pulmonary Center, and [3]Evans Center for Implementation and Improvement Sciences, Department of Medicine, Boston University School of Medicine, Boston, Massachusetts; and [4]Department of Health Law, Policy, and Management, Boston University School of Public Health, Boston, Massachusetts

ORCID ID: 0000-0002-1557-2787 (P.G.L.).

Growing grapes to make wine begins with careful selection of varietals to match the local climate. (1) Macroclimates, or local areas with particular temperature, solar, precipitation, and soil patterns, are often well-suited to particular types of grapes (e.g., Cabernet Sauvignon grapes thrive in the Napa Valley). Interestingly, this precise pairing of grape species and atmospheric conditions often occurs down to individual vineyards (mesoclimates) and even specific rows of vines (microclimates) (2). The success of matching grape varietals to climate has significant consequences on yields and quality (3). In simple terms, grapes planted in the right fields produce the highest-quality wine.

Analogously, hospital leaders are increasingly paying attention to the fit between hospital units and the patients they serve. For example, under- and overtriage of critically ill patients can be problematic, both through potential direct patient harm (e.g., undertriage may delay important therapies early in critical illness, whereas overtriage may expose patients to unnecessary procedures) (4) and through indirect harm (e.g., overtriage leads to less sick patients occupying ICU beds, causing capacity strain and necessitating suboptimal "boarding" of critically ill patients elsewhere) (5). It is now well accepted that even within a "macro" environment such as an acute care hospital, attentiveness to selecting the optimal patients for hospital "meso" and "micro" environments may provide higher-quality patient care.

The idea of caring for patients in the right location extends beyond acuity of illness alone. Patients have particular needs that may correspond to specific diagnoses, treatments, procedures, or organ systems dysfunction. Consider, for example, hospital oncology wards staffed by nurses specially

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trained to administer chemotherapy, or neurology units equipped with electroencephalogram-monitoring staff members and therapists with expertise in acute stroke rehabilitation (6). Common ward microclimates match patients with unique care needs to their optimal environments. However, few studies have considered the potential effects of matching ward microclimates to patients with pulmonary disorders, who may also have complex care needs.

One approach to examining the effects of pulmonary specialization units is to explore the consequences when pulmonary patients overflow to standard hospital wards. Enter Kohn and colleagues, whose recent study in this issue of *AnnalsATS* (pp. 249–252) asked the question (7): "Do patients with complex respiratory needs have different outcomes when assigned to general medical wards rather than pulmonary specialty wards?"

The authors conducted a retrospective cohort study across three hospitals affiliated with an urban academic medical center to evaluate variation in important hospital (e.g., length of stay, mortality) and posthospital outcomes (e.g., 90-day readmissions) associated with pulmonary patient admission to nonpulmonary wards (a scenario they call geographic dispersion). After adjusting for potential confounders including demographics, comorbidities, insurance status, admission diagnosis, admission source, severity of illness, code status, pulmonary service census, and season, they found that geographic dispersion was associated with increased length of stay and posthospitalization discharge to a skilled nursing facility, but no significant differences in mortality or 90-day readmission. In other words, although patients ultimately left the hospital, and remained out of the hospital, at the same rates, those treated on nonpulmonary wards required more time to be discharge-ready and needed more postacute care assistance than those cared for on pulmonary-specific wards.

Enhancing the strength of the authors' findings is their use of rigorous modeling methods, including (1) methods to adjust for between-hospital variation, (2) attempts to control for a number of important confounders specified *a priori*, and (3) competing risk analysis to account for length-of-stay variation in patients who died versus those who did not (8). Further, the authors helpfully report E-values as an assessment of the robustness of their effect estimates to hypothetical unmeasured confounders; the E-value estimates the effect size that an unmeasured confounder would need to have to negate the reported findings (9).

The authors hypothesize that their findings may be a result of important differences between pulmonary and nonpulmonary wards, including proximity to the primary clinical team, availability of respiratory support devices such as high-flow nasal canula oxygen or noninvasive ventilation, the number of respiratory therapists per patient, and case manager familiarity with pulmonary-specific durable medical equipment (e.g., airway clearance devices). To these possibilities, we would add one more: although nurse:patient ratios were reportedly the same across both ward types, there may be important differences in nursing experience and comfort caring for patients with complex respiratory conditions.

This study prompts additional important questions. First, could an unmeasured confounder (of enough strength to exceed the study's reported E-values of 1.3 for length of stay and 2.3 for discharge disposition) explain the authors' findings? In particular, confounding by indication is possible: if only one pulmonary bed is available but two pulmonary patients need care, do specific diagnoses, patient needs, or acuity determine which patient goes to the nonpulmonary overflow ward? Alternatively, confounding by indication might actually mask an increased magnitude of association between dispersion and negative outcomes if less sick patients were the ones being triaged to the overflow units.

Second, do pulmonary-specific wards benefit all patients with respiratory disease in the same way? Potential heterogeneity of treatment effects for pulmonary wards depend on the underlying causal mechanisms. For instance, if pulmonary patients benefit from specialty wards through care from expert respiratory therapists or nurses, then patients with high-acuity pulmonary secretion clearance needs may gain more than patients with chronic pulmonary disease admitted with nonpulmonary conditions (e.g., urinary tract infection and sepsis). Information regarding specific pulmonary needs is unlikely to be captured by diagnosis codes or severity of illness categories, and thus may not be identifiable in this study. In contrast, if the advantage of specialty wards is through proximity to the primary clinical team, relative benefits would likely be similar regardless of underlying condition.

Third, how generalizable are these results to other specialty wards and to other hospital systems? Although this study involved several hospitals, all were part of the same system, and it is likely that arrangements of clinical resources vary across other hospital systems. Thus, future studies ought to be done to replicate these findings at other hospitals with geographically distinct pulmonary units.

Beyond confirmatory studies, what should we do with findings that patients cared for off of their specialty ward have longer hospital stays and more use of skilled nursing facilities? Increasing the bed capacity of pulmonary-specific units is likely not a feasible option. Almost 60% of pulmonary patients received care on other wards in Kohn's study, suggesting that major structural changes would be required to double pulmonary ward capacity. Effective alternative strategies to increasing pulmonary ward capacity would depend on mechanisms of benefit. For example, it may be more feasible to bring specialized respiratory therapy care to pulmonary patients dispersed across the hospital than to geographically admit pulmonary patients. However, specialized pulmonary nursing care would be less feasible to deliver across wards. If off-ward pulmonary patients receive less attention from the primary team, then it is possible that eliminating geographic wards altogether would also eliminate proximity biases in care. Said differently, if all pulmonary patients are geographically dispersed, then no pulmonary patients are dispersed.

In the end, it is important to keep in mind which mechanistic factors in high-quality care delivery hospitalization are most modifiable. It is not feasible for a winemaker to replicate the Bordeaux macroclimate in the Arctic, but given generally favorable conditions, viticulturists can influence local microclimates through shade, watering, soil, and changes to neighboring vines (10). It remains to be seen the extent to which differences in hospital pulmonary specialty ward microclimates matter for patients, and if so, whether we should bring some patients into wards where they may thrive at the risk of harming others who are excluded from optimal microclimates. ■

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