


Intensity of End-of-Life Care for Dual-Eligible Beneficiaries With Cancer and the Impact of Delivery System Affiliation

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BACKGROUND: Dual-eligible beneficiaries, who qualify for Medicare and Medicaid, are a vulnerable population with much to gain from efforts to improve quality. Integrated delivery networks and cancer centers, with their emphasis on care coordination and communication, may improve quality of care for dual-eligible patients with cancer at the end of life. **METHODS:** This study used Surveillance, Epidemiology, and End Results registry data linked with Medicare claims to evaluate quality for beneficiaries who died of cancer and were diagnosed from 2009 to 2014. High-intensity care was evaluated with 7 end-of-life quality measures according to dual-eligible status with multivariable logistic regression models. Regression-based techniques were used to assess the effect of delivery system affiliation (ie, cancer center or integrated delivery network vs no affiliation). **RESULTS:** Among 100,549 beneficiaries who died during the study interval, 22% were dually eligible. Inferior outcomes were identified for dual-eligible beneficiaries in comparison with nondual beneficiaries across nearly every quality measure assessed, including >1 hospitalization in the last 30 days (12.6% vs 11.3%; $P < .001$) and a greater proportion of deaths occurring in a hospital setting (30.2% vs 26.2%; $P < .001$). Receipt of care in an affiliated delivery system was associated with reduced deaths in a hospital setting and increased hospice utilization for dual-eligible beneficiaries. **CONCLUSIONS:** Dual-eligible status is associated with higher intensity care at the end of life. Delivery system affiliation has a modest impact on quality at the end of life, and this suggests that targeted efforts may be needed to optimize quality for this group of vulnerable patients. *Cancer* 2021;127:4628-4635. © 2021 American Cancer Society.

KEYWORDS: cancer, dual-eligible, end of life, quality.

INTRODUCTION

Nearly 900,000 Medicare beneficiaries are diagnosed with cancer annually at a cost of more than \$34 billion.¹ Among beneficiaries 65 years old or older, 18% qualify for Medicaid in addition to Medicare because of low income and are considered dually eligible.² Dual-eligible beneficiaries also disproportionately are African American and female and have not attained a high school degree. In addition, higher percentages of breast, lung, and prostate cancers are seen among dual-eligible beneficiaries in comparison with Medicare-only beneficiaries.³ Despite making up only 18% of the Medicare population, dual-eligible beneficiaries account for 31% of total Medicare spending.²

For dual-eligible and non-dual-eligible beneficiaries with cancer, a substantial portion of Medicare spending occurs in the last year of life.^{4,5} Although much of this spending is necessary and appropriate, there has been ongoing quality concerns regarding the use of overly aggressive care at the end of life for patients with cancer.^{6,7} Examples of aggressive care include repeated emergency department visits, hospitalizations, and intensive care unit admissions for patients with limited life expectancy and underutilization of hospice services. Importantly, avoiding such aggressive care was perceived by family members of Medicare beneficiaries who died of cancer to be consistent with patient preferences and indicative of better end-of-life care.⁸ With approximately 21% of Medicare spending occurring in the final year of life, often in the form of aggressive care, end-of-life care may be one area where value could be maximized through pursuit of higher quality care.⁹⁻¹²

Because of greater barriers to accessing care, well-coordinated care is particularly beneficial to the dual-eligible population.¹³ Many believe that health systems can play a critical role in building the infrastructure to foster highly efficient, coordinated care and improved communication among care teams, which may be particularly beneficial for dual-eligible beneficiaries.¹⁴ At designated cancer centers such as National Cancer Institute- or Commission on

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This study used the linked Surveillance, Epidemiology, and End Results (SEER)-Medicare database. The interpretation and reporting of these data are the sole responsibility of the authors. We acknowledge the efforts of the National Cancer Institute; the Office of Research, Development, and Information of the Centers for Medicare & Medicaid Services; Information Management Services, Inc; and the SEER program tumor registries in the creation of the SEER-Medicare database.

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Cancer-accredited programs, there is often increased attention on education, communication, treatment planning, and decision-making for patients and families with cancer. Likewise, integrated delivery networks place a strong emphasis on efficiency and care coordination. Accordingly, health care delivery systems that have an affiliation with a cancer center or an integrated delivery network may already have resources and systems in place to optimize quality of care for dual-eligible beneficiaries with cancer. Recognizing that end-of-life care may be a particularly high-utilization phase of cancer care, we sought to understand differences in aggressive care for dual-eligible beneficiaries and whether delivery systems with a cancer or integrated focus may be able to mitigate these differences.

Using Surveillance, Epidemiology, and End Results (SEER) registry data linked with Medicare claims data, we evaluated the association between delivery system structure and the receipt of high-intensity care at the end of life for dual-eligible beneficiaries with cancer. We hypothesized that delivery systems with a cancer center or integrated affiliation would deliver lower intensity care at the end of life for dual-eligible beneficiaries with their focus on coordination of care, efficient care delivery, and improved communication.

MATERIALS AND METHODS

Data Sources

We used 3 data sets to complete our analyses. First, we used SEER-Medicare data from 2009 to 2014 to identify eligible patients, define dual eligibility as well as clinical and demographic characteristics, and measure our outcomes of interest. Within SEER-Medicare, we used claims from the Medicare Provider Analysis and Review (MedPAR), Carrier, Outpatient, Hospice, and Patient Entitlement and Diagnosis Summary File (PEDSF) files. Second, we used the American Hospital Association annual survey to identify participation in the American College of Surgeons Commission on Cancer program and hospital characteristics. Third, we used the Health Care Organization Services data set from IQVIA (formerly IMS Health) to identify individual hospitals, clinics, and health systems that compose integrated delivery systems. This data set links professionals and organizations to allow us to define participants of health systems and relationships among them with an identifier unique to the data set. Linkages between SEER-Medicare, American Hospital Association annual survey, and IQVIA data sets were performed with the Centers for Medicare &

Medicaid Services certification number (formerly the Medicare identification or provider number).

Identification of the Study Sample

Using these data, we identified patients between the ages of 66 and 99 years who died of breast, colon, lung, liver, esophageal, ovarian, prostate, bladder, kidney, or pancreatic cancer between 2009 and 2014. We used the date of death from the PEDSF to establish the last 12 months of life. We determined dual eligibility for patients by using the monthly indicator in the PEDSF. Consistent with the Centers for Medicare & Medicaid Services definition, a patient was considered dually eligible if he or she had at least 1 month of dual-eligible enrollment in the last 12 months of life.⁹ We required continuous enrollment in Medicare Parts A and B for the last year of life to ensure complete claims data and the ability to fully capture utilization.

Defining Delivery System Types

We characterized delivery systems according to their affiliation with a cancer center or an integrated delivery system. Those with a cancer focus were identified on the basis of accreditation by the American College of Surgeons Commission on Cancer or a National Cancer Institute-designated cancer center.¹⁵ A delivery system was classified as integrated on the basis of prior methodology using a list of the top 100 integrated delivery systems from *Becker's Hospital Review*.^{16,17} On the basis of our prior work demonstrating similar quality outcomes at the end of life among cancer-focused systems, integrated delivery systems, and systems that both had a cancer focus and were integrated, we combined these delivery system types into a single category (ie, affiliated delivery systems).¹⁸ Delivery systems lacking a cancer focus or integration were classified as nonaffiliated delivery systems. Patients were assigned to a delivery system on the basis of where they had received the majority of their inpatient hospital care (eg, the hospital with the plurality of MedPAR claims). For patients with a tie in the number of MedPAR claims, we assigned the patient to the delivery system with the longest length of stay.

End-of-Life Quality Measures

We used 7 claims-based end-of-life quality measures relevant to patients with cancer, all evaluated at the patient level (Table 1). Our measures were chosen on the basis of recommendations from the National Quality Forum and/or the American Society of Clinical Oncology as well

TABLE 1. End-of Life Quality Measures

Measure
>1 hospitalization in last 30 d of life
Admitted to ICU in last 30 d of life
Death in a hospital setting
>1 emergency department visit in last 30 d of life
Chemotherapy in last 14 d of life
% not enrolled in hospice at the time of cancer death
% of patients with <3 d in hospice

Abbreviation: ICU, intensive care unit.

as prior literature establishing these measures as indicators of end-of-life quality of care.^{8,19-21} Each measure was constructed to identify higher intensity, lower quality care in the last 12 months of life and was calculated at the health system level. Higher percentages indicated a larger proportion of patients receiving higher intensity care. We also created an “all or none” measure for the use of high-intensity care at the end of life if the patient met any of the individual 7 measures.²²

Statistical Analysis

We first compared patient and delivery system characteristics between dual-eligible and non-dual-eligible beneficiaries with χ^2 tests. Next, we fit multivariable logistic regression models to estimate the association between dual status and the probability of patients meeting each measure. We adjusted all models for marital status, age, sex, cancer type, hospital bed size, and hospital teaching status on the basis of a priori choices guided by a conceptual model of factors that may influence utilization and quality at the end of life.²³⁻²⁵ We specified standard errors to account for clustering at the delivery system level.

Finally, we used a regression-based decomposition approach, the Blinder-Oaxaca method, to determine the relative contribution of the delivery system to the quality of end-of-life care for dual-eligible beneficiaries versus non-dual-eligible beneficiaries.²⁶⁻³¹ The statistical analysis was performed with Stata (version 16; StataCorp, College Station, Texas).³² This study was deemed exempt by our institutional review board.

RESULTS

We identified 100,549 Medicare beneficiaries from 2009 through 2014 who died of cancer and met our inclusion criteria; 21,798 of these patients (22%) were identified as dually eligible, with 85% being dual-eligible for at least 11 of the last 12 months of life. The majority of the patients ($n = 79,330$; 79%) received care in an affiliated delivery system. However, dual-eligible beneficiaries were more likely to receive care

in a nonaffiliated delivery system ($n = 6028$; 28%) in comparison with non-dual-eligible beneficiaries ($n = 15,191$; 19%; $P < .001$).

Table 2 shows patient and delivery system characteristics stratified by dual eligibility in the last year of life. Compared with nondual beneficiaries, dual-eligible beneficiaries dying of cancer were less likely to be married (29% vs 53%; $P < .001$). Dual-eligible beneficiaries also were less likely to be White (68% vs 90%) and to have Hispanic ethnicity (13% vs 3%; $P < .001$) and were more often women (55% vs 47%; $P < .001$). There were no clinically significant differences in the age distributions or types of cancers between dual and nondual beneficiaries. Dual-eligible beneficiaries were more likely to be treated in delivery systems that had fewer hospital beds and were nonteaching hospitals and in census areas with higher levels of poverty.

Table 3 displays results from our multivariable model evaluating the receipt of high-intensity care at the end of life for dual-eligible beneficiaries versus non-dual-eligible beneficiaries. Dual-eligible patients received higher intensity end-of-life care across all measures except being in hospice for <3 days and receiving chemotherapy in the last 14 days of life. Dual-eligible beneficiaries were more likely to die in a hospital setting (30.4% of dual-eligible patients vs 26.2% of non-dual-eligible patients; $P < .001$) and not be enrolled in hospice at the time of death (36.1% of dual-eligible patients vs 31.2% of non-dual-eligible patients; $P < .001$).

When we used the Blinder-Oaxaca decomposition model, we were able to break down the gap in quality of care between dual and nondual beneficiaries and examine factors making up the differences noted in Table 3. We found that receipt of care in an affiliated delivery system was associated with fewer hospitalizations in the last 30 days of life, a reduced number of deaths in a hospital setting, and improved hospice utilization for dual-eligible patients compared with dual-eligible patients receiving care in a nonaffiliated system (Fig. 1). Specifically, for dual-eligible beneficiaries, receiving care at an affiliated delivery system reduced the gap in quality by 95% for hospitalizations ($P = .02$), by 90% for death in a hospital setting ($P < .001$), and by 57% for hospice utilization ($P < .001$) in comparison with dual-eligible beneficiaries receiving care at nonaffiliated delivery systems. Figure 1 presents adherence to end-of-life quality measures for dual-eligible beneficiaries stratified according to the receipt of care in affiliated delivery systems versus nonaffiliated delivery systems.

TABLE 2. Patient and Health System Characteristics Stratified According to Beneficiary Dual-Eligible Status

Characteristic	Total		Dual-Eligible		Not Dual-Eligible		P
	No.	%	No.	%	No.	%	
Marital status							<.001
Single	8504	8	3435	16	5069	6	
Married	48,391	48	6277	29	42,114	53	
Divorced/separated	9247	9	3695	17	5552	7	
Widowed	30,032	30	7373	34	22,659	29	
Unknown	4375	4	1018	5	3357	4	
Age							<.001
66-69 y	16,870	17	4235	19	12,635	16	
70-74 y	23,107	23	5293	24	17,814	23	
75-79 y	22,395	22	4802	22	17,593	22	
80-84 y	19,710	20	3830	18	15,880	20	
≥85 y	18,467	18	3638	17	14,829	19	
Race							<.001
White	85,974	86	14,915	68	71,059	90	
Black	9297	9	4072	19	5225	7	
Asian or Pacific Islander	4770	5	2627	12	2143	3	
American Indian/Alaska Native	391	<1	150	1	241	<1	
Unknown	117	<1	34	<1	83	<1	
Ethnicity							<.001
Hispanic	5369	5	2785	13	2584	3	
Non-Hispanic	95,180	95	19,013	87	76,167	97	
Sex							<.001
Male	51,279	51	9795	45	41,484	53	
Female	49,270	49	12,003	55	37,267	47	
Cancer type							<.001
Bladder	4967	5	856	4	4111	5	
Breast	4986	5	1302	6	3684	5	
Colorectal	13,631	14	3259	15	10,372	13	
Esophagus	3054	3	564	3	2490	3	
Kidney	2645	3	519	2	2126	3	
Liver	3116	3	1062	5	2054	3	
Lung	48,359	48	10,583	49	37,776	48	
Ovarian	3260	3	587	3	2673	3	
Pancreas	12,440	12	2276	10	10,164	13	
Prostate	4091	4	790	4	3301	4	
Urban/rural							<.001
Urban	82,336	82	17,244	79	65,092	83	
Rural	18,213	18	4554	21	13,659	17	
Hospital bed size							<.001
6-199 beds	27,650	28	6726	31	20,924	27	
200-399 beds	39,967	40	8833	41	31,134	40	
≥400 beds	32,932	33	6239	29	26,693	34	
Teaching hospital							<.001
Teaching hospital	49,474	49	9735	45	39,739	50	
Nonteaching hospital	51,075	51	12,063	55	39,012	50	
Census poverty %							<.001
0% to <5% poverty	21,001	21	2061	9	18,940	24	
5% to <10% poverty	23,793	24	3385	16	20,408	26	
10% to <20% poverty	27,216	27	6263	29	20,953	27	
20% to 100% poverty	20,301	20	7711	35	12,590	16	
Unknown	8238	8	2378	11	5860	7	
Delivery system							<.001
Affiliated (cancer center and/or integrated)	79,330	79	15,770	72	63,560	81	
Not affiliated	21,219	21	6028	28	15,191	19	
Overall dual status	100,549	100	21,798	22	78,751	78	

No significant differences were attributable to receipt of care in an affiliated system with respect to intensive care unit admissions and emergency department utilization in the last 30 days of life, receipt of chemotherapy in

the last 14 days of life, or a short duration of hospice utilization. Finally, for our all or none outcome evaluating the receipt of any measure of high-intensity care at the end of life, we again noted a positive effect for

TABLE 3. Receipt of High-Intensity End-of-Life Care Stratified by Beneficiary Dual-Eligibility Status

Outcome	Dual-Eligible	Not Dual-Eligible	Difference	<i>P</i>
>1 hospitalization in last 30 d of life	12.6%	11.3%	1.3%	<.001
Admitted to ICU in last 30 d of life	16.9%	15.4%	1.5%	<.001
Death in a hospital setting	30.4%	26.2%	4.2%	<.001
>1 emergency department visit in last 30 d of life	14.7%	12.1%	2.6%	<.001
Chemotherapy in last 14 d of life	3.7%	6.4%	-2.7%	<.001
% not enrolled in hospice at the time of cancer death	36.1%	31.2%	4.9%	<.001
% of patients with <3 d in hospice	27.0%	27.6%	-0.7%	.12
All or none	52.8%	47.9%	4.9%	<.001

Abbreviation: ICU, intensive care unit.

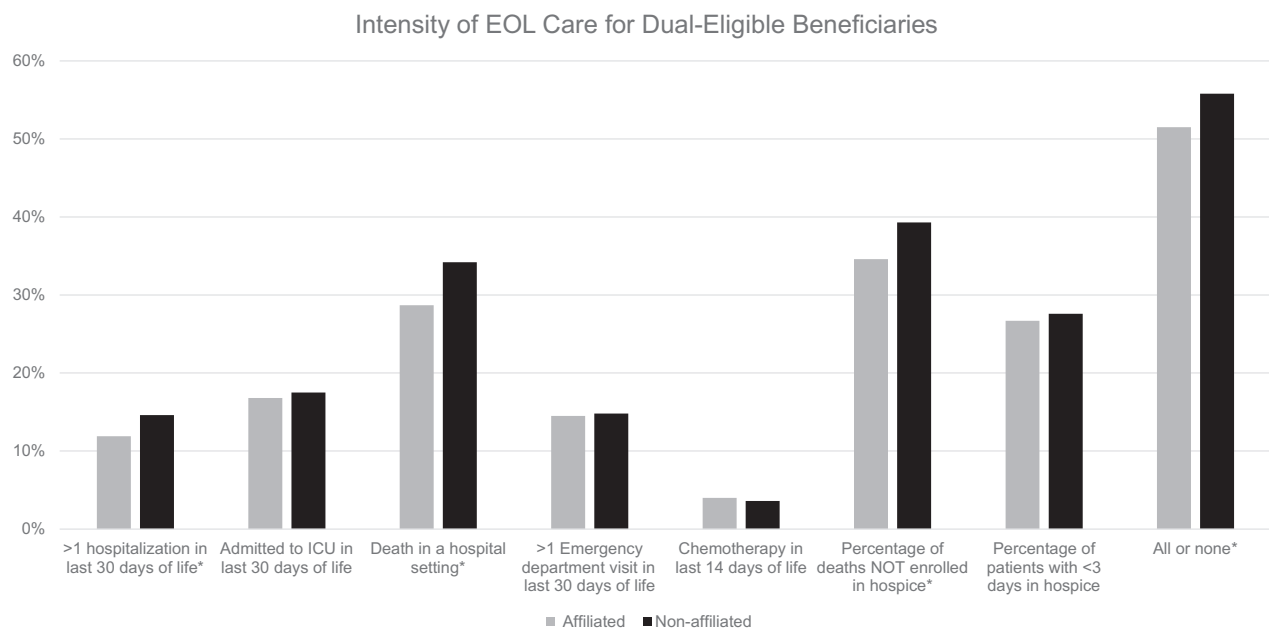


Figure 1. Receipt of high-intensity EOL care for dual-eligible beneficiaries stratified by delivery system affiliation. An asterisk indicates a significant contribution of the delivery system affiliation to quality of care ($P < .05$). EOL indicates end of life; ICU, intensive care unit.

dual-eligible beneficiaries treated in affiliated delivery systems: the gap in quality of care would have been 51% wider in a nonaffiliated delivery system ($P = .003$).

DISCUSSION

We evaluated the utilization of end-of-life care for dual-eligible beneficiaries with cancer and the impact of delivery system affiliation with a cancer center or an integrated delivery network. Our study has 2 principal findings. First, dual-eligible beneficiaries dying of cancer have higher utilization at the end of life in comparison with non-dual-eligible beneficiaries across most measures. Second, certain differences in utilization at the end of life for dual-eligible beneficiaries are mitigated in part by receiving care at an affiliated delivery system such as a cancer center or an

integrated delivery network. These findings highlight important system-level opportunities to reduce high-intensity care at the end of life and improve the quality of end-of-life care for dual-eligible patients with cancer.

Our findings of higher utilization at the end of life for dual-eligible beneficiaries echoes prior work showing increased emergency department visits as well as higher costs when dual-eligible patients are hospitalized at the end of life.^{12,33} Several studies examining end-of-life care for dual-eligible patients have found that hospice enrollment is associated with fewer hospitalizations and readmissions at the end of life, and this may be one potential strategy for decreasing aggressive end-of-life care.³⁴⁻³⁷ Despite lower utilization and costs related to higher intensity care with hospice enrollment, disparities in hospice utilization

exist, particularly for racial and ethnic minorities and for individuals residing in counties with high social vulnerability.³⁸⁻⁴¹ We similarly noted lower utilization of hospice among our dual-eligible beneficiaries compared with non-dual-eligible beneficiaries; this difference was mildly affected by the receipt of care in an affiliated system.

Our findings highlight a potential role that delivery system affiliation plays in mitigating the negative impact of dual eligibility on the receipt of high-intensity end-of-life care. One explanation for this may be that affiliation with a cancer center or within an integrated delivery system provides access to resources, infrastructure, and a focus on communication that can address patient preferences for care at the end of life. Several authors have highlighted the benefits of communication and formal advanced care planning on utilization at the end of life.^{42,43} However, a critical component of these discussions is understanding patient preferences, which are individualized and differ across racial and ethnic groups and are highly relevant within the dual-eligible population. Some studies have shown a preference for more intensive treatment plans among patients from racial or ethnic minority groups.^{44,45} Barriers to advanced care planning, palliative care, and hospice discussions may exist within African American patients to a greater extent in comparison with White patients and need to be assessed in a culturally appropriate manner.⁴⁶ Examples of possible interventions include tailored patient education, improved access to health care, and high-quality communication to establish patient rapport.^{47,48} Given their low-income status, dual-eligible patients likely also face economic barriers to receiving high-quality end-of-life care. Patients must balance competing financial demands to meet basic food, shelter, and safety needs versus paying for out-of-pocket medical expenses.⁴⁹ Additionally, patients with fewer economic resources may have unstable housing and neighborhood environments or a lack of available caregivers, and this may make home-based care impossible. Finally, the availability of palliative and hospice services (eg, inpatient hospice beds, hospice providers, and nurses) is often limited in low-income communities, and this leaves clinics and hospitals as the only available resource for end-of-life care.^{50,51} A deeper understanding of the barriers and needs at the end of life for dual-eligible and other vulnerable populations and their support systems will be critical to developing policies to eliminate these disparities.

Our study has several limitations. First, we elected to combine integrated delivery systems and cancer centers under the umbrella of affiliated delivery systems because

of prior work showing similar benefits for improving quality in end-of-life care as well as a significant number of delivery systems that are classified as both cancer centers and integrated systems. However, the mechanisms, resources, and philosophies driving quality differences among dual-eligible beneficiaries may be different for integrated systems versus cancer centers. Second, because of our inclusion criteria, our findings may not be generalizable to dual-eligible beneficiaries under the age of 65 years, and this may be important for preferences regarding end-of-life care. Finally, quality of care at the end of life is highly personal. Patient preferences are the centerpiece of delivering goal-concordant care at the end of life. Understanding preferences enables physicians and other health care providers to more effectively communicate, educate, and inform about prognostication and available options. Ultimately, the pursuit of higher or lower intensity care at the end of life is a decision that should be made by the patient with the support of his or her family and care team.

These limitations notwithstanding, our study has important implications for patients, physicians, and health systems. Our findings show a continued disparity in the utilization of end-of-life care for dual-eligible beneficiaries; however, these differences may be mitigated in part by the delivery system where a patient receives the majority of his or her care. Although often times patients, particularly those with constrained resources, have limited options on where to receive care, where patients receive care is a potentially modifiable factor, and they may specifically seek out physicians and other health care providers with whom they feel most comfortable discussing end-of-life scenarios and preferences. Physicians and other health care providers (eg, social workers and care navigators) should be aware of this gap in care for dual-eligible patients and other vulnerable populations so that needs can be identified and resources can be appropriately directed to patients and families who need them. For health systems, there is an opportunity to improve value in care at the end of life by devoting time and resources to help providers to develop improved communication skills and a deeper knowledge of how to elicit patient preferences across the spectrum of patients, regardless of vulnerability, and by using available resources to deliver goal-concordant care.

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CONFLICT OF INTEREST DISCLOSURES

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AUTHOR CONTRIBUTIONS

Lindsey A. Herrel: Conceptualization, formal analysis, data curation, methodology, funding acquisition, and writing—original draft. **Ziwei Zhu:** Formal analysis, data curation, methodology, and writing—review and editing. **Andrew M. Ryan:** Formal analysis, methodology, and writing—review and editing. **Brent K. Hollenbeck:** Conceptualization, methodology, and writing—review and editing. **David C. Miller:** Conceptualization, data curation, methodology, funding acquisition, and writing—review and editing.

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