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Permalink

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Journal

Journal of Veterinary Emergency and Critical Care, 28(3)

ISSN

1534-6935

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Publication Date

2018-05-01

DOI

10.1111/vec.12715

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Analysis of the first-time pass rate of the American College of Veterinary Emergency and Critical Care certifying examination (2010–2015)

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Abstract

Objectives – To disseminate information regarding the annual pass rates for the American College of Veterinary Emergency and Critical Care (ACVECC) certifying examination. To compare the first-time pass rates (FTPR) of ACVECC residents trained in academic and private practice settings.

Design – Retrospective study.

Setting – ACVECC examination.

Animals – None.

Interventions – None.

Measurements and Main Results – Anonymized ACVECC examination performance data from 2010–2015 inclusive were analyzed. Overall pass rates and FTPR were calculated for all candidates and categorized by type of residency training program. The overall pass rate for all candidates was 64.3%. The median pass rate for the 6-year period was 63.8% [IQR 59.3–67.3%]. The FTPR for residents trained in academic programs was significantly higher than for residents trained in private practice (77.1% vs 47.2%, $P < 0.0001$). When residents were subdivided by species-focus of training program, there was no significant difference between academic versus private practice training programs for large-animal candidates ($P = 0.2$), but there remained a significant difference between residency training programs for small-animal candidates ($P < 0.0001$).

Conclusions – Between 2010 and 2015 residents trained in academic training programs were significantly more likely to pass the ACVECC certifying examination compared to those trained in private practice training programs. The causes of this difference are uncertain, are likely multifactorial and warrant further investigation.

(*J Vet Emerg Crit Care* 2018; (): 1–5) doi: 10.1111/vec.12715

Keywords: ACVECC, Angoff, examination performance, pass point, residency training

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Presented in part at the ACVECC Annual Business Meeting at the International Veterinary Emergency and Critical Care Symposium, September 2016, in Grapevine, TX.

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Submitted November 18, 2016; Accepted December 14, 2016.

Abbreviations

ACVECC	American College of Veterinary Emergency and Critical Care
ACVO	American College of Veterinary Ophthalmologists
FTPR	first-time pass rate

Introduction

The qualification of Diplomate of the American College of Veterinary Emergency and Critical Care (ACVECC) is awarded after completion of all credential requirements inclusive of a 3-year approved residency training

program and success on the certifying examination. The examination process has been refined over the last 10 years as certain components have been removed, altered, or reduced in importance. For instance, viva voce examinations have been eliminated and the multiple choice component reduced from 600 to 300 questions. These alterations have streamlined the examination process, eliminated potential biases within the examination process, improved question quality and consistency, and reduced the time burden on examiners and test takers. The ACVECC certifying examination adopted its current format in 2010. The examination consists of a written component with questions constructed around clinical vignettes, and 2 sets of multiple choice questions that test candidates' understanding and knowledge of physiology, pathophysiology, disease diagnosis and management, and the veterinary medical literature.

In parallel with alterations to the examination, the scoring system has also been amended. In 2010, a modified-Angoff rating system was adopted,¹ to ensure the examination was reviewed, edited, and scored by a wide number of ACVECC Diplomates beyond the Examination Committee. The modified-Angoff rating process requires that scorers, blinded to the answer, review each question, and predict the percentage of minimally qualified candidates to answer the question correctly.² This process determines the pass point for the examination and enables the examination to discriminate between candidates with acceptable day-one skills and knowledge from those without.³ This ensures candidates awarded Diplomate status are capable to uphold the standards of the College and provides quality assurance to consumers for board-certified critical care veterinarians.

The ACVECC Board of Regents and the Examination and Residency Training Committees are committed to improve the quality of the ACVECC examination process, primarily through monitoring the annual pass rate. This information has typically been shared with members of the ACVECC but has not been widely or publicly disseminated. In order to use this information to provide excellence in residency training, and a contemporary, rigorous but fair certifying examination, we need to acquire and evaluate additional data on residency programs and on examination performance. Concerns have been raised by the ACVECC community about the overall pass rate of the examination and about the high ratio of residency programs compared to applicants. A number of these concerns echo those raised previously in an eloquent discussion of the legal ramifications of board-certifying examination procedures.⁴ Potential explanations for the perceived low pass rate include variation in candidate aptitude, variation in residency training program quality, poor alignment of the examination con-

tent with skills and expertise required of an ACVECC Diplomate, biases inherent in the exam setting or grading processes and an examination that was excessively stringent. Published legal opinions suggest that an overall pass rate below 70–75% would be unusual for professional examinations and as such the certification process should be subject to scrutiny.⁴

The concerns raised by ACVECC about the optimal way to train, assess, and certify specialist critical care veterinarians are not unique. These subjects have been widely investigated in various fields of human medical practice. A recent study of examination performance of candidates for the American College of Veterinary Ophthalmologists (ACVO) certifying examination suggested the type of residency training program might influence examination success rate.⁵ They evaluated the performance of 71 candidates and identified that the first-time pass rate (FTPR) among candidates from academic residency programs was higher than for those trained in private practice residency programs, although the difference was not significant. Academic program residents were significantly more likely to pass the written portion of the ACVO examination than their peers trained in private practice. No association between case or surgical procedure numbers and the FTPR was identified in that study.⁵ The potential for similar associations in the field of veterinary emergency and critical care has not been previously explored.

The aims of this study were therefore to investigate the annual pass rates for the ACVECC certifying examination from 2010 to 2015 and to determine if the type of residency program (academic vs private practice) was associated with the FTPR for ACVECC examination candidates. We hypothesized that the FTPR for residents is not influenced by the type of training programs.

Materials and Methods

Anonymized examination performance data from 2010 to 2015 inclusive were obtained from the Office of the Executive Secretary of the ACVECC. Specifically, we requested data on candidate residency type, date of completion of the residency training program, and date of passing the certifying examination. The FTPR was calculated for all candidates and separated by group according to the type of residency training program. Those groups are also used by others, including the Veterinary Internship and Residency Matching Program, to report training program data. Data were also collected on the workplace location (academic vs private practice) for all members of the examination committees during the period 2010–2015. Academic programs were defined as any program at an institution with the terms "University," "College," or "School" in the name. Categorical data are

expressed as number and percent. Continuous data are expressed as median and interquartile range (IQR). Univariate comparisons of categorical data were performed using Fisher's exact test. Alpha was set at 0.05.

Results

Between 2010 and 2015 inclusive, 297 residents sat the ACVECC board certifying examination for the first time (Table 1). Of those, 191 passed on their first attempt (FTPR = 64.3% overall over 6 years). The median pass rate for the 6-year period was 63.8% [IQR 59.3–67.3%]. The FTPR for residents trained in academic programs was significantly higher than for residents trained in private practice programs (77.1% vs 47.2%, $P < 0.0001$) (Table 2). When residents were subdivided between large-animal and small-animal training programs, there was no significant difference between residency training programs for large-animal candidates ($P = 0.2$), but there remained a significant difference between residency training programs for small-animal candidates ($P < 0.0001$) (Table 3). During the 2010–2015 period, 46% of the examination committee members practiced in academic programs, while 54% were in private practice.

Discussion

The overall pass rate for the ACVECC certifying examination has varied moderately over the last 6 years, with a median value of 63.8%. This is comparable to the pass rates from the subspecialties within the American College of Veterinary Internal Medicine, the median of which was 66% in 2014.^a If we assume that residency training programs and the abilities of residency cohorts vary comparatively little from year-to-year, then the examination itself is the likely source of this annual pass rate variation. While the exam structure was consistent throughout the 2010–2015 period evaluated, the examination content was different every year. A small number of questions are repeated within a large multiple choice question database, while the clinical examination is entirely rewritten every year. This ensures candidates retaking the test do not gain an advantage through prior experience and that the questions reflect current practice and literature. However, the process of rewriting the examination is a potential source of error and variation in quality, and difficulty. The Angoff scoring process should account for such variation and this subcommittee makes significant efforts to eliminate uncertainty, ambiguity, inaccuracy, and incompleteness in both questions and answer keys. We speculate that some of the year-to-year variation in test performances is due to undetected changes in the level of difficulty within the clinical vi-

gnettes and questions that are not accounted for in the pass point approval process.

Our analysis of ACVECC certifying examination performance clearly indicates that residents trained in academic programs have a significantly higher FTPR than their contemporaries trained in private practice. This finding has important implications for residents and residency training programs and is of concern to the ACVECC community. For residents, this finding may influence their choice of training programs with consequences for them as well as the training programs. For academic training programs this might increase demand for positions in their programs and potentially enhance the overall quality of their applicant pool. This will also potentially increase competition between academic programs, however, and increase the workload to evaluate, interview, and rank potential applicants. For private practice residency programs this finding might reduce the number and quality of resident applicants with potentially detrimental administrative and financial consequences. We recognize that our analysis cannot determine how much the training programs themselves influence resident examination performance. There are many potential causes of the difference in resident performance and, at present, we can only speculate which of these accounts for the majority of the variation. The potential causes can be summarized into three groups; examination factors, resident factors, and training program factors.

As mentioned above, the overall pass rate and the annual variation in this rate suggests that the examination itself is not a perfect test. The examination committee and the Angoff scorers are deliberately chosen to represent a mixture of recent and experienced Diplomates, working in both academic and private practice settings, as indicated by the 46:54 split we documented. Despite the efforts to achieve balance and fair representation, it is plausible that a selection bias exists within the examination committee that favors academic residents. Diplomates willing to voluntarily contribute large amounts of time to serve on the examination committee may have an inherent affinity for academic pursuits and educational objectives. It is possible that they may also feel that they have a vested interest to make the examination challenging in order to protect the value of their qualifications. Although the committees were evenly balanced during the study period, the Chairs of the ACVECC examination committee throughout this period worked in academic institutions. This may also have biased the nature and content of the examination in favor of residents from academic training programs.

Examinations need both internal and external validity. Internal validity can be assessed by evaluating the consistency of results across items within a test.

Table 1: Year-by-year summary of all candidates that completed the American College of Veterinary Emergency and Critical Care board certification examination (SA = small animal, LA = large animal)

Year (s)	New candidates	SA total	SA academic	SA private	LA total	LA academic	LA private
2010–2015	297	281	157	124	16	13	3
2010	52	49	31	18	3	3	0
2011	51	45	23	22	6	6	0
2012	51	49	22	27	2	1	1
2013	50	48	30	18	2	2	0
2014	39	36	23	13	3	1	2
2015	54	54	28	26	0	0	0

Table 2: First-time pass rate for all candidates that completed the American College of Veterinary Emergency and Critical Care board certification examination

Year	P value	Pass rate academic		Pass rate private	
		n	%	n	%
2010–2015	$P < 0.001$	131/170	77.1	60/127	47.2
2010	0.07	26/34	76.5	9/18	50.0
2011	0.02	22/29	75.9	9/22	40.9
2012	0.31	20/23	87.0	20/28	71.4
2013	0.04	21/32	65.6	6/18	33.3
2014	0.01	20/24	83.3	6/15	40.0
2015	0.05	22/28	78.6	10/26	38.5

Table 3: First-time pass rate for Small Animal candidates that completed the American College of Veterinary Emergency and Critical Care board certification examination

Year	P value	Pass rate academic		Pass rate private	
		n	%	n	%
2010–2015	<0.001	123/157	78.3	60/124	48.4
2010	0.06	24/31	76.7	9/18	50.0
2011	0.02	18/23	78.3	9/22	40.9
2012	0.48	19/22	86.4	20/27	74.1
2013	0.04	20/30	66.7	6/18	33.3
2014	0.02	20/23	87.0	6/13	46.2
2015	0.01	22/28	78.6	10/26	38.5

External validity reflects the generalizability of the results of a test. In the context of a professional examination, it refers to the ability of the examination to determine that a successful candidate is competent to carry out the tasks expected of a specialist with this qualification. External validity of the ACVECC examination is based on alignment of test content with an analysis of the tasks and duties of an ACVECC Diplomate. The last ACVECC task analysis was conducted in 2003. A new job task analysis that will reflect current practice is presently underway, with results expected in 2017 and may necessitate a realignment of examination content. The potential effect on the FTPR of a misalignment between examination content and the tasks performed by ACVECC Diplomates is hard to determine. It might be

expected to equally affect both academic and private practice residents unless the changes that have occurred over time have disproportionately reduced the relevance of the examination to the tasks ACVECC Diplomates undertake in private practice. Recruiting recent graduates as Angoff scorers may improve credibility,⁶ and reduce the influence of discrepancies between Diplomates' roles and the examination. The new job task analysis is the best way to reduce this potential source of bias, however.

Variation in resident aptitude is another potential cause of the difference in performance. It is not clear if successful candidates are better trained to be ACVECC Diplomates, are better prepared for the examination, or perform better on examinations. There may be some inherent differences in the types of resident candidates

who apply to, and match with, academic compared to private practice residency programs. Certainly, residency selection is inherently subjective.⁷ Academic centers may attract residents who are more academically minded,⁸ or those with higher veterinary school grade point averages. It is possible that these criteria influence who is likely to pass the ACVECC examination, although the data from human medical residencies are conflicting.^{9–11} Residents in academic programs may be more demonstrative and request and obtain more mentor contact than their peers in private practice.

The final potential source of the observed difference in resident examination performance is variation in the quality of the training provided by different residency training centers. It is recognized in human medical training that some characteristics of residency training programs influence the performance of their trainees on certifying examinations. In particular, training in a large program appears to enhance the likelihood of success in board certification examinations.^{12,13} It is plausible that academic residency programs have some inherent advantages that enables them to better prepare residents for the examination. Academic centers typically have lower caseloads compared with private practices and frequently have higher ratios of ACVECC Diplomates to residents and higher ratios of ACVECC Diplomates to caseload than comparable private practices (ACVECC Residency Training Committee data not shown). Academic programs have teaching, training, and education among their primary missions. As such, the culture in these centers is inclined towards resident training and may manifest as prioritization of protected resident education time,¹⁴ an expectation for residents to teach and train others, and greater availability of teaching and training resources including medical simulation,¹⁵ comprehensive libraries, and extensive online journal access.

As discussed, there are many potential explanations for the observed difference in FTPR. In order for residents, training programs, the examination committee, and the wider ACVECC community to address this discrepancy, we must first understand the causes. To this end we have launched a prospective study that will run for the next three years and include three additional resident cohorts. We will survey resident, training center, and exam factors in detail in an effort to identify the best predictors of examination success. During this time frame, it is also expected that minor adjustments to the examination will occur based on the results of the forthcoming job task analysis.

Acknowledgments

The authors thank Kathleen Liard for her assistance with data collection.

Footnote

^a Kornegay JN. 2014–2015 Annual Report to the ACVIM Membership. [Accessed 11-08-2016] http://www.acvim.org/Portals/0/Diplomate%20Pages/Documents/ACVIM-010%201415%20Annual%20Report_r8_singles.pdf

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