Second Edition

Veterinary Medical Education

A Practical Guide

Edited by

Jennifer L. Hodgson | Jacquelyn M. Pelzer

WILEY Blackwell

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Jennifer L. Hodgson
Virginia Maryland College of Veterinary Medicine, VA, USA

Jacquelyn M. Pelzer
Virginia Maryland College of Veterinary Medicine, VA, USA

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This book is dedicated.....

To Dave, Kevin and Noelle for their continued support and patience.

To all the authors, for their outstanding contributions to the book
and their continued dedication to improving veterinary medical education.
Finally, to veterinary students worldwide, who encourage us every day to become better educators.

Contents

List of Contributors

Hilda Mejia Abreu, BA, MS, PhD
Associate Dean, Admissions, Student Life and Inclusivity
College of Veterinary Medicine
Michigan State University
USA

Cindy L. Adams, MSW, PhD
Professor
Faculty of Veterinary Medicine
University of Calgary
Canada

Liz Armitage-Chan, VetMB, DipACVAA, PhD, FHEA, MRCVS
Professor of Higher Education
Royal Veterinary College
University of London
UK

Sarah Baillie, BVSc, MSc, PhD, MRCVS
Professor Emerita of Veterinary Education
Bristol Veterinary School
University of Bristol
UK

Catriona E. Bell, BVetMed, MRCVS, PhD, PGCAP, PFHEA, NTFS
Director of Academic Development and Learning Enhancement
Queen Margaret University
Edinburgh
UK

Melinda Bell, BSc, BVMS, MANZVS (Medicine of Cats), SFHEA, PhD
Senior Lecturer in Small Animal Primary Care
School of Veterinary Medicine
Murdoch University
Australia

Harold G.J. Bok, PhD, DVM
Vice Dean for Education
Faculty of Veterinary Medicine
Utrecht University
The Netherlands

Karen Martens Brandt, DVM
Director, Education and Research Division
American Veterinary Medical Association
USA

Joey Burt, DVM, MPH
Assistant Dean for Clinical Services
College of Veterinary Medicine
Mississippi State University
USA

Martin Cake, BSc, BVMS, PhD
Associate Professor of Veterinary Anatomy
School of Veterinary Medicine
Murdoch University
Australia

Caroline Cantner, VMD
Director for Professional Development
American Association of Veterinary Medical Colleges
USA

Kristin P. Chaney, DVM, DACVIM (LAIM), DACVECC
Clinical Associate Professor and Assistant Dean for Curriculum and Assessment
School of Veterinary Medicine & Biomedical Sciences
Texas A&M University
USA

Kimathi Choma, DVM, MPH
Assistant Dean, Diversity, Recruitment and Retention
College of Arts and Sciences
Kansas State University
USA

Kauline Cipriani, PhD
Vice President for Inclusive Excellence & Professor
College of Veterinary Medicine and Biomedical Sciences
Colorado State University
USA

Bobbi Conner, DVM, DACVECC
Clinical Associate Professor
Virginia-Maryland College of Veterinary Medicine
Virginia Tech
USA

Karen K. Cornell, DVM, PhD, Diplomate ACVS
Associate Dean for Professional Programs
School of Veterinary Medicine & Biomedical Sciences
Texas A&M University
USA

Jared A. Danielson, BA, MS, PhD
Senior Associate Dean for Academic and Student Programs, Success, and Innovation
College of Veterinary Medicine
Iowa State University
USA

Esther de Groot, PhD
Assistant Professor
University Medical Center
Utrecht University
The Netherlands

Marc Dilly, DVM, PhD, MHEd
External Lecturer
Faculty of Veterinary Medicine
Justus Liebig University
Germany

Laura Dooley, BVSc (Hons), Grad Cert (UniTeach), PhD
Senior Lecturer
Melbourne Veterinary School
University of Melbourne
Australia

Adryanna Drake, MA, MS, PhD, LCMFT
Clinical Assistant Professor
College of Veterinary Medicine
Kansas State University
USA

Virginia R. Fajt, DVM, PhD
Clinical Professor
School of Veterinary Medicine & Biomedical Sciences
Texas A&M University
USA

Kirsty Fox, BSc (Hons), MSc
Senior Developer in Distance Learning and Veterinary Education
Royal Veterinary College
University of London
UK

Philippa Gibbons, BVetMed (Hons), MS, PGDipVetEd, DACVIM(LA)
Associate Professor
School of Veterinary Medicine
Texas Tech University
USA

William Gilles, DVM
Director, WisCARES
School of Veterinary Medicine
University of Wisconsin-Madison
USA

M. Daniel Givens, DVM, PhD
Professor and Dean
Virginia-Maryland College of Veterinary Medicine
Virginia Tech
USA

Lisa M. Greenhill, MPA, EdD
Chief Diversity Officer
Senior Director for Institutional Research
American Association of Veterinary Medical Colleges
USA

David Guile, BA, MA, PhD
Professor
University of London Royal Veterinary College
UK

McArthur Hafen, Jr., PhD
Clinical Associate Professor
College of Veterinary Medicine
Kansas State University
USA

Kent Hecker, PhD, MSc, BSc
Chief Assessment Officer
International Council for Veterinary Assessment
USA

and

Professor
Faculty of Veterinary Medicine
University of Calgary
Canada

Stephen A. Hines, DVM, PhD
Emeritus Professor
College of Veterinary Medicine
Washington State University
USA

Jennifer L. Hodgson, BVSc (Hons), GradCertEdStud (Higher Ed), DACVM, PhD
Professor Emerita
Virginia-Maryland College of Veterinary Medicine
Virginia Tech
USA

Erik H. Hofmeister, DVM, DACVAA, DECVAA, MA, MS
Professor
College of Veterinary Medicine
Auburn University
USA

Karen Dyer Inzana, DVM, PhD, DACVIM (Neurology)
Associate Dean for Academic Affairs
Shreiber School of Veterinary Medicine
Rowan University
USA

Eloise K.P. Jillings, BVSc, MVS, PhD
Associate Dean – Admission and Students
School of Veterinary Medicine
Massey University
New Zealand

Stephanie Johnson, BA, MSW
Associate Professor
School of Veterinary Medicine
Louisiana State University
USA

Kimberly Jones, MA, BS, BA
Assistant Dean for Student Affairs
College of Veterinary Medicine
Western University of Health Sciences
USA

Lisa M. Keefe, MS, PhD
Curriculum Initiatives Manager and Vice Provost for Teaching and Learning
College of Veterinary Medicine
Purdue University
USA

Tierney Kinnison, BSc, MSc, PGCertVetEd, PhD
Lecturer
Royal Veterinary College
University of London
UK

Jodi A. Korich, DVM
Associate Dean for Education
College of Veterinary Medicine
Cornell University
USA

Mark B. Krockenberger, BSc(vet), BVSc, PhD, GradCertEdStud (Higher Ed)
Professor
Sydney School of Veterinary Science
University of Sydney
Australia

Suzanne M. Kurtz, BA, MA, PhD
Professor Emerita
College of Veterinary Medicine
Washington State University
USA

and

Professor Emerita
Cumming School of Medicine
University of Calgary
Canada

Sunshine M. Lahmers, DVM, PhD, DACVIM (Cardiology)
Clinical Associate Professor
Virginia-Maryland College of Veterinary Medicine
Virginia Tech
USA

India Lane, DVM, MS, EdD
Associate Dean for Academic and Student Affairs
College of Veterinary Medicine
University of Tennessee
USA

Rachael-Kate Llewellyn, AVBS (Hon), GD-CE, GC-SAECC, DVM, MANZCVS (Emergency and Critical Care)
Senior Lecturer
Melbourne Veterinary School
University of Melbourne
Australia

Lydia Love, DVM, DACVAA
Clinical Assistant Professor
College of Veterinary Medicine
North Carolina State University
USA

Andrew Maccabe, DVM, MPH, JD
Chief Executive Officer
American Association of Veterinary Medical Colleges
USA

Jill Maddison, BVSc, DipVetClinStud, PhD
Professor
Royal Veterinary College
University of London
UK

Lynn M. Maki, MAEd
Associate Dean for Student Academic Affairs
School of Veterinary Medicine
University of Wisconsin-Madison
USA

Nicole J.J.M. Mastenbroek, PhD, DVM
Assistant Professor
Faculty of Veterinary Medicine
Utrecht University
The Netherlands

Susan M. Matthew, PhD, BVSc (Hons), BSc (Vet)(Hons), GradCertEdStud (HigherEd)
Berger Keatts Distinguished Professor and Associate Chair of Veterinary Medical Education
College of Veterinary Medicine
Washington State University
USA

Stephen A. May, MA, VetMB, PhD, FRCVS, DVR, DEO, DipECVS, FHEA
Senior Vice Principal and Professor of Education
Royal Veterinary College
University of London
UK

Kathryn Mills, BVSc (Hons), GradCertEdStud (Higher Ed), MANZCVS (Surgery), FHEA
Lecturer in Surgery
Sydney School of Veterinary Science
University of Sydney
Australia

Paul C. Mills, BVSc, PhD, MACVSc, MPhil (Vet Ed), PFHEA
Professor
School of Veterinary Science
University of Queensland
Australia

Laura K. Molgaard, DVM
Dean
College of Veterinary Medicine
University of Minnesota
USA

Liz Mossop, BVM&S, MMedSci (Clin Ed), PhD
Professor and Provost
University of Lincoln
UK

Laura L. Nelson, DVM, MS
Associate Dean and Director of Academic Affairs
College of Veterinary Medicine
North Carolina State University
USA

Jacqueline M. Norris, BVSc (Hons), MVS, PhD, FASM, GradCertEdStud (Higher Ed), MRCVS (Veterinary Microbiology)
Professor and Dean
Sydney School of Veterinary Science
University of Sydney
Australia

Paula Parker, BVSc (Hons), MVS, MBA, MANZCVS (Emergency and Critical Care), GAICD
Chief of Professional Relationships and Strategic Initiatives
American Veterinary Medical Association
USA

Rebecca Parkes, BSc, BVetMed (Hons), PhD, Cert AVP, PGCert (Vet Ed), FHEA, MRCVS
Associate Professor
School of Veterinary Medicine
St George's University
Grenada

Tim J. Parkinson, BVSc, DBR, MEd, PhD, DipECAR, FRCVS
Emeritus Professor
School of Veterinary Medicine
Massey University
New Zealand

Matthew Pead, BVetMed, PhD, MRCVS, FHEA, CertSAO
Academic Director of Professional Assessment and Development and Director of Clinical Skills Center
Royal Veterinary College
University of London
UK

Jacquelyn M. Pelzer, DVM, MS, PGCVE
Assistant Dean, Student Affairs and Admissions
Virginia-Maryland College of Veterinary Medicine
Virginia Tech
USA

Clive J.C. Phillips, BSc, MA, PhD
Professor
Curtin University Sustainability Policy (CUSP) Institute
Curtin University
Australia

and

Professor
Institute of Veterinary Medicine and Animals Sciences
Estonian University of Life Sciences
Estonia

Valerie Ragan, DVM
Professor of Practice and Director for the Center for Public and Corporate Veterinary Medicine
Virginia-Maryland College of Veterinary Medicine
Virginia Tech
USA

Emma K. Read, DVM, MVSc, DACVS
Associate Dean for Professional Programs
College of Veterinary Medicine
The Ohio State University
USA

Susan M. Rhind, BVM&S, PhD, FRCPath, PFHEA, MRCVS
Chair of Veterinary Medical Education
The Royal (Dick) School of Veterinary Studies
University of Edinburgh
UK

Cassidy Rist, DVM, MPH
Associate Professor of Practice and Associate Director for the Center for Public and Corporate Veterinary Medicine
Virginia-Maryland College of Veterinary Medicine
Virginia Tech
USA

Bonnie R. Rush, DVM, MS, DACVIM
Professor and Dean
College of Veterinary Medicine
Kansas State University
USA

Shane M. Ryan, BS, MEd
Assistant Dean for Curriculum and Chief Diversity Officer
College of Pharmacy
Medical University of South Carolina
USA

S. Kathleen Salisbury, DVM, MS, DACVS
Associate Dean for Academic Affairs
College of Veterinary Medicine
Purdue University
USA

Peggy L. Schmidt, DVM, MS
Associate Dean for Professional Programs
School of Veterinary Medicine
University of Wisconsin-Madison
USA

Ayona Silva-Fletcher, BVSc, MSc, PhD, MA (Med Ed)
Professor
Royal Veterinary College
University of London
UK

Jan Šlapeta, MVDr, PhD, GradCertEdStud (Higher Ed)
Professor
Sydney School of Veterinary Science and Institute for Infectious Diseases
University of Sydney
Australia

Joseph Taboada, DVM, DACVIM
Professor
School of Veterinary Medicine
Louisiana State University
USA

Rosanne M. Taylor, BVSc (Hons), PhD, GradDipClinStud, GradCert (Higher Ed)
Professor Emerita
Sydney School of Veterinary Science
University of Sydney
Australia

John H. Tegzes, MA, VMD, Dipl ABVT
Interim Dean
College of Veterinary Medicine
Western University of Health Sciences
USA

Elizabeth Tudor, BVSc (Hons), PhD
Professor and Honorary Professorial Fellow
Melbourne Veterinary School
University of Melbourne
Australia

Cees van der Vleuten, MA, PhD
Scientific Director
School of Health Professions Education
Maastricht University
The Netherlands

Courtney Vengrin, BS, MS, PhD
Senior Director of Assessment
International Council for Veterinary Assessment
USA

Joy M. Verrinder, PhD, BA, DipT, MBA (Professional Ethics and Governance)
Strategic Director
Animal Welfare League Queensland
Australia

Sheena M. Warman, BSc, BVSc, DSAM, DipECVIM(CA), PGCertHE, SFHEA, EdD, FRCVS
Professor
Bristol Veterinary School
University of Bristol
UK

Jesse Watson, EdS
Director of Curriculum and Educator Development
College of Veterinary Medicine
North Carolina State University
USA

James L. Weisman, DVM
Assistant Dean for Clinical Education and Clinical
Clinical Associate Professor
College of Veterinary Medicine
Purdue University
USA

Preface

Veterinary medicine is unique among the health sciences due to the breadth of veterinary practice and the expertise required of day-one graduates. Since the publication of the first edition of this textbook the expectations of our graduates have only expanded and underlie the challenges faced by veterinary medical educators within a changing world, including ongoing advancements in veterinary education and the technology with which this may be delivered. To address this conundrum, competency-based veterinary education (CBVE) has emerged to clearly identifying the day-one competencies of veterinary graduates and how these can be taught and evaluated. To this end, we have significantly expanded this section of the textbook in this updated edition. Similarly, in this second edition of the textbook, we have tried to capture other emerging themes in veterinary education including widening access for admissions, programmatic assessment, academic advising, and student support, safe and inclusive learning environments, transition to practice and career opportunities, safety culture, educational leadership, and trends in global veterinary medical education. With these new chapters, as well as our updated chapters, we hope to highlight new initiatives, share new ideas, engage educators, and encourage further development so that veterinary medical education continues to advance.

A continuing goal of this textbook is to provide practical guidance for educators and to be inclusive of new as well as more experienced teachers. Most importantly, *Veterinary Medical Education: A Practical Guide* aims to be accessible and useful to the reader, so that they can assimilate the information and tips into their preclinical and clinical teaching as well as other academic activities.

We have attempted to organize the book into the major themes that encompass veterinary medical education, with individual chapters on specific topics. As with the first edition, we wanted to stay true to selecting those authors who are passionate about advancing veterinary education. We focused on authors with expertise in their subject matter, with something fresh to say, and from all walks of veterinary medical education across the world. We hope the readers will regard the authors and their backgrounds as a very integral part to the value of the book.

Finally, we gratefully acknowledge all the advice and support from Blackwell Wiley including Erica Judisch Susan Engelken and Merryl Le Roux. We would like to particularly thank Tim Bettsworth for his superb assistance, attention to detail, and unending patience whilst editing and proofreading all the chapters. We believe the book will be “groovy” Tim.

Icons

To help guide readers to some of the fundamental messages in each chapter, authors have created boxes, together with their corresponding icons, which represent different themes. The boxes and themes are centered around: main points (Key messages), the application of a tool or process (How to...), information supporting the chapter's theme (Where's the evidence?), highlighting a specific topic (Focus on...), contemplation of themes within the chapter (Reflections on...), familiarizing the reader with educational terminology or concepts (What's the meaning of...?), alerting the reader to handy recommendations (Quick tips on...), and describing characteristics or illustrations of concepts and theories (Example of...).

Key messages 

How to... 

Where's the evidence? 

Focus on... 

Reflections on... 

What's the meaning of...? 

Quick tips on... 

Example of... 

Part 1

Student Selection

1

Student Selection

Jacquelyn M. Pelzer[1], James L. Weisman[2], and Eloise K.P. Jillings[3]

[1] *Virginia-Maryland College of Veterinary Medicine, Virginia Tech, USA*
[2] *College of Veterinary Medicine, Purdue University, USA*
[3] *School of Veterinary Science, Massey University, New Zealand*

Box 1.1 Key messages

- Veterinary program selection serves as the gateway for entry into the profession.
- The veterinary selection process in many institutions is based more often on historical decisions rather than research-led innovation.
- Meeting the needs of society will require that veterinary schools increase the diversity of their student communities and adapt to processes that focus on different outcomes.
- There is significant variability between the selection processes of different veterinary programs based on deeply rooted history and culture.
- Veterinary programs have been heavily reliant on undergraduate (also known as preveterinary or preapplication) academic performance as a means to select students.
- Nonacademic personal attributes should be considered during the application review process through a holistic review process.
- There is relatively little research in the area of student selection and its ability to predict clinical competence.
- Review and analysis of admissions processes are essential to detect possible barriers to application and ensure defensibility.

Introduction

The topic of veterinary student selection usually draws robust debate among veterinarians, since most of them have an opinion on the best way to select students into the veterinary program. Most veterinarians base their opinion on the criteria and methods used when they were admitted; however, with the many changes, including applicants' undergraduate experiences, changing workforce demands, and general societal impact on admissions practices today, there is limited correlation with today's veterinary school admissions practices. Some would suggest that selection should be on entirely academic merit due to its perceived objectivity, while others would favor an entirely subjective assessment, and most would prefer something in between. Everyone knows someone who should, or perhaps more importantly should not, have been admitted to a veterinary program, and the blame generally falls at the feet of the admissions committee.

One might argue that the selection assessment process is the single most important assessment that a school conducts (Eva et al. 2004; Greenhill et al. 2015): since attrition rates in the health professions are generally low, selected applicants usually graduate (Prideaux et al. 2011). Thus, the selection committees determine not only who becomes a veterinary student but ultimately who might become a veterinarian and enters the workforce. This is a significant responsibility for what is usually a small group (e.g. 5–15) of veterinarians and nonveterinary educators in an institution.

Veterinary Medical Education: A Practical Guide, Second Edition. Edited by Jennifer L. Hodgson and Jacquelyn M. Pelzer.

There is a high level of competition for places in medical training programs, as applicant numbers usually greatly exceed available places (Salvatori 2001; Prideaux et al. 2011), Thus it is increasingly important that the selection processes used are appropriate and evidence based.

There are multiple stakeholders of healthcare selection, including but not limited to the applicant, the institution, the profession, the public, and in some cases the government (Salvatori 2001; Patterson et al. 2012). Admissions committees of health professions programs have a relatively formidable task to balance their responsibilities to all these respective stakeholders.

For the applicants, admissions processes need to be transparent, fair, and consistently applied so that there can be confidence that selection decisions reflect the performance of the applicants, rather than the personal preferences of the admissions committee members. Admissions committees generally aim to select students who are likely to succeed not only in the program but also in the profession (Salvatori 2001; Kogan et al. 2009). For programs funded with public funds, there is also responsibility to the public and to the appropriate government funding body to utilize those funds appropriately and judiciously (Salvatori 2001).

If you accept the idea that veterinary programs are the gateway to the profession (Kogan and McConnell 2001), and that selection committees have multiple stakeholders to whom they are responsible, then it follows that veterinary admissions processes need to be evidence based, with decisions made utilizing reliable and valid tools. In the 2010 Ottawa Conference consensus statement on assessment for selection for the healthcare professions, it states that "selection processes therefore need to be credible, fair, valid and reliable, and above all publicly defensible, and should follow the same quality assurance processes as in course assessment" (Prideaux et al. 2011). Currently in many institutions, the veterinary selection process is based more on historical practices rather than on research-led and evidence-based decisions.

Global Perspective on Veterinary Admissions

In this chapter, we explore the state of current admissions processes globally, discuss the common selection tools being utilized, highlight their evidence basis, and offer a guide to reviewing the institutional veterinary selection process.

Given the large number of veterinary programs globally, this chapter focuses on those that are accredited by the American Veterinary Medical Association (AVMA 2022). When assessed against the medical selection literature, there is comparatively little published research regarding veterinary selection. As such, this chapter draws on both medical and veterinary literature.

Workforce Needs

The scope of veterinary practice continues to change with societal demographics, demand for an increased food supply, and the growing need for the inclusion of veterinary medical science contributions to many areas of health sciences. In 2019, Millennials outnumbered the number of Baby Boomers. They are more educated and are a cohort which is more ethnically diverse (Cilluffo and Cohn 2019). Millennials have an increased demand for higher levels of medical care and services for their pets, which adds to the growing demand on veterinary services. As both populations and per capita income grow, there is notable increase in demand for animal-based protein, which results in growing demand for improved animal health and growth efficiency to meet the expanding food supply demands. As the "One Health" concept approaches 20 years in existence, the increasing demand for veterinary medical science input is unmatched. These factors support the notable 19% increased demand for veterinary employment through 2030 according to the US Bureau of Labor Statistics (Bureau of Labor Statistics 2022).

According to the American Association of Veterinary Medical Colleges (AAVMC), approximately 4000 US citizens graduate from AAVMC member institutions in 2021 (AAVMC 2022). This number of graduates does not meet the projected employment demand of veterinarians. To meet both increased demands in terms of number and diversity of scope of practice, institutions need to review and change their admissions targets. Seeking to admit academically qualified students who bring a diverging breadth of career scope is one such change. These applicants have nontraditional preveterinary undergraduate majors, such as engineering, biomechanics, or public health. Not only are their undergraduate majors different but also some applicants who made the decision to apply to veterinary school later than others may have less animal and veterinary experience when compared to those applicants who have always been on the preveterinary path. Adapting admissions criteria to the profession's workforce needs will continue to be a key focus for all veterinary medical institutions.

Selection Methods, Tools, and Assessments

Historically, many medical training programs have weighted academic performance heavily or even relied on it as the sole determinant of selection (Patterson et al.

2016a). However, it has been identified that personal characteristics other than academic ability are required for veterinary economic and career success (Conlon et al. 2012). There is general agreement in the literature that, in light of this, both academic and nonacademic characteristics should be included in the assessment of applicants (Salvatori 2001).

Within the US and Canada, the application process of most institutions usually includes academic and nonacademic criteria. However, outside of these countries, many institutions still focus heavily on academic performance in the selection of veterinary applicants. This will likely change for AVMA-accredited programs over the coming years, as Standard 7 of the AVMA/COE accreditation guidelines states: "factors other than academic achievement must be considered for admission criteria" (AVMA 2022). However, the question remains as to what the most appropriate "other factors" to consider would be.

One admissions process will not fit all institutions, since the goals of every institution vary. While no selection process is perfect, or could be expected to be, selection decisions need to be made utilizing reliable and valid tools to minimize the level of imperfection. Institutions that desire fair, defensible selection policies need to conduct analyses of their own data. This is also increasingly important for outcomes assessment of admissions required for AVMA accreditation.

In this section, we discuss the more common application assessments of academic performance, standardized testing, prior experience (veterinary, animal, and/or research), personal statements, references, and interviews. A recent review article succinctly summarized some of the characteristics of the assessment tools that we discuss here, as shown in Box 1.2.

Academic Performance

Preveterinary grade point average (GPA) is the most common criterion utilized by veterinary selection committees (Roush et al. 2014). For postgraduate veterinary programs, the previous GPA may be calculated in various ways, with some common methods including overall undergraduate GPA, science GPA, prerequisite classes GPA, or the GPA from a specified number of credits taken most recently. For undergraduate veterinary programs, calculation of the GPA can be even more variable, depending on whether students are selected directly after high school or as part graduates or graduates. The COVID-19 pandemic added yet more complexity to the calculation and comparison of undergraduate GPA due to more institutions utilizing pass/fail grading.

In considering the wider health professions selection literature, numerous studies have demonstrated that the best predictor of academic success within the program is pre-admission academic grades. Once this is explored a little more, there is a good consensus that pre-admission GPA is the best predictor of academic performance in the preclinical component of the program. However, there is less consensus on whether it is also predictive of clinical performance (Salvatori 2001).

In the veterinary literature, several authors reported undergraduate GPA to be predictive of performance in the veterinary program (Zachary and Schaeffer 1994; Rush et al. 2005; Fuentealba et al. 2011), while the authors of one recent study reported the contrary (Roush et al. 2014). Again, on closer examination some authors reported differences in the level of association between prior GPA and preclinical and clinical performance within the program. Fuentealba et al. (2011) found that preveterinary GPA predicted performance in the preclinical years, but not the clinical

Box 1.2 Where's the evidence? Review of selection methods

Patterson et al. (2016b) conducted a systematic review of selection methods in medical education to determine how effective they were. They reviewed the most common selection methods and determined the reliability, validity, and candidate acceptability, and how well they promoted widening access. Their findings were as follows:

- Academic record as a selection method is reliable, valid, and highly acceptable to candidates, although it was poor at widening access.
- Structured interviews, such as the multiple mini interview (MMI), were both reliable and valid, candidates found them accessible, and they had a moderate impact on widening access.
- Situational judgment tests (SJTs) were highly reliable and valid, had a high candidate acceptance rate, and had a good impact on widening access.
- Aptitude tests were highly reliable, but their validity was variable. Acceptability by candidates and the impact on widening access were moderate.
- Personality tests, letters of reference, and traditional interviews were selection methods that had low reliability, validity, and widening of access, but candidates found acceptable.

years. This lack of predictive value of preveterinary academic performance on performance in the clinical component of the program is supported by other authors (Roush et al. 2014; Molgaard et al. 2015). Since these studies were conducted on data collected from various veterinary programs, the lack of agreement may reflect the different methods used to analyze the data and the differing conditions under which the data was collected (e.g. different selection policies). As mentioned, the method of GPA calculation can vary significantly between institutions, and alteration of the method in and of itself could significantly affect the results.

Further influencing GPA interpretation is the grade inflation phenomenon, which diminishes the discriminative power of calculated GPAs. There is also evidence that academic performance assessments may be discriminatory against some demographic groups. As such, an overreliance on high academic performance may have contributed to both the gender shift and the lack of diversity within veterinary programs.

Perhaps most importantly is that there is a lack of evidence to support that applicants who are the highest academic achievers become the most competent veterinarians. While GPA is the best predictor of academic performance within health professional programs, it only explains a small amount of the variance, which suggests that other variables also contribute to program performance (Salvatori 2001). Therefore, the increased interest in determining valid and reliable assessments of nonacademic selection criteria appears justifiable.

Standardized Testing

Standardized test scores are commonly utilized in the selection of students into the health professions. For medical student selection, the Medical College Admission Test (MCAT) has been shown to be predictive for academic performance in medical programs (Salvatori 2001; Prideaux et al. 2011). The most common standardized test utilized for veterinary student selection, particularly in the US, is the Graduate Record Examination (GRE). While the GRE has been reported to significantly predict master's and doctoral degree program performance in multiple disciplines (Kuncel et al. 2010), the veterinary literature is less clear.

Several authors have reported that GRE scores were predictive of performance in the veterinary program (Danielson and Burzette 2020), while others have not found the same association (Danielson et al. 2011; Roush et al. 2014). Like the reported findings for the predictive validity of GPA discussed previously, these studies were conducted on data collected from various veterinary programs, so would have the same associated limitations. This highlights the need for institutions using the GRE in the selection of their students to conduct analyses on their own student data to inform selection policy.

Multiple institutions have stopped using the GRE due to concerns of negative impact on diversity (Lloyd and Greenhill 2020). Further, during the COVID-19 pandemic, many programs were forced to temporarily suspend use of the GRE due to closure of the testing centers. As of 2022, fewer than five accredited veterinary schools globally continue to use the GRE.

Holistic Review

Holistic review is a process that aligns itself with the mission of the veterinary professional program and takes into account an applicant's experiences, attributes, and academic performance as well as how an applicant would contribute to the veterinary profession. An authentic holistic review is defined by key core principles, which can be applied within a program's own culture and process (see Box 1.3).

Box 1.3 What's the meaning?

Holistic Review: Core Principles

1) Veterinary programs should employ broad selection criteria which aligns with the individual college's mission and goals, as well as including a variety of diverse attributes.
2) In addition to academic criteria, consideration should be given to experiences and attributes.
   a) Each applicant has very different backgrounds and experiences and should be considered within the context of how these experiences will impact the student and college community.
   b) The process must be applied transparently and fairly to all applicants.
   c) Programs need to review their processes to determine which experiences and attributes predict the success of a candidate.
4) Currently, if aligned with the college mission and outcomes, race and ethnicity may be considered factors when making admission-related decisions.

Source: Adapted from AAMC (2022).

The student selection process consists of human and evidence-based decisions, which are critical to the fairness and transparency of the process. Holistic review supports this process by providing a framework that is created at the program level based on evidence, college mission statement, and commitment to widening access.

Personal Statements

There is limited literature published regarding the effectiveness, reliability, and validity of personal statements within veterinary school admissions. The research evidence regarding the use of personal statements in selecting veterinary and medical students suggests that they lack validity and reliability and are highly susceptible to coaching (Salvatori 2001; Hecker and Violato 2010; Patterson et al. 2016b; Kelly et al. 2018). It is also difficult to determine whether applicants actually wrote the letter themselves (Hecker and Violato 2010). Despite the concerns regarding their use, personal statements are commonly employed in both veterinary and medical student selection; however, there is little evidence to support the continuation of this practice (Salvatori 2001).

We would recommend that veterinary selection committees critically evaluate their use of personal statements in the student selection process.

Reference Letters

In a systematic review of the studies regarding medical selection from 1997 to 2015, only nine articles regarding the use of references in medical student applications were found. From these, there was a clear consensus that referees' reports (also known as letters of reference) were of limited use in predicting the performance of students at medical school (Patterson et al. 2016b). One reason for this may be that in reference letters referees tend not to focus on the applicant's areas of weakness, and may be overly positive in other respects (Stedman et al. 2009). One way to potentially address this issue might be to adopt a standardized letter of reference, similar to the Veterinary Internship and Residency Matching Program, which could address specific and reliable factors of potential success.

Authors in both the veterinary and medical literature suggest that there is little evidence to support the use of letters of reference (Salvatori 2001; Molgaard et al. 2015; Patterson et al. 2016b). Despite the lack of evidence, many selection committees continue to utilize reference letters. We would agree that the use of letters of reference in veterinary student selection is not well founded in evidence, and would recommend that veterinary selection committees evaluate their use of references for reliability, validity, and defensibility.

Veterinary and Animal Experience

Many veterinary programs worldwide have a requirement for applicants to have experience with animals, or in veterinary clinical or research environments. These requirements can vary, from a small number of days seeing clinical practice only to hundreds of hours across several different areas. While quantifying these experiences is possible, verifying them is very time consuming. Furthermore, determining the quality of these experiences to allow comparisons across applicants is almost impossible. Inflexibility regarding this requirement may have a direct impact on an individual's decision to apply to veterinary school.

There is little to no literature published in this area demonstrating that having these experiences makes a student a better veterinarian. However, a candidate who is exposed to the profession prior to commitment to a professional program may be able to make a more informed decision regarding their career choice (Wang et al. 2015). A recent study did find that, although preprofessional program GPA predicted academic success within the preclinical curriculum, previous experiences predicted success within clinical rotations (Stegers-Jager et al. 2015). However, there was no determination of how many hours of preplacement experience were necessary to obtain clinical success.

Access to these experiences can vary widely, and strict adherence to a set number of hours required may have a negative impact on diversity. In a recent survey of veterinary applicants through the Veterinary Medical College Application Service (VMCAS), those who identified as underrepresented in veterinary medicine reported finding it hard to access hours and subsequently had lower numbers of veterinary and animal experience hours (Lloyd and Greenhill 2020). As an example, students from lower socioeconomic backgrounds are unlikely to have the financial freedom to travel outside of their area to obtain experiences if unavailable locally, or to devote significant time to unpaid endeavors.

Interviews

Interviews are a common assessment tool used during the admissions process among veterinary programs, although there are programs that do not interview at all. The format of the interview varies greatly between programs: it can be either unstructured or structured in nature and range from an individual interviewer to a panel or series of interviewers. Furthermore, each program may have a different reason for interviewing, the interviews may be managed differently, and the number of sessions may vary. There is some conflicting evidence in regard to interviews, but

overall evidence suggests that the traditional interview is not a valid or reliable tool to use for admissions decisions (Patterson et al. 2016b).

Traditionally, interviews have been conducted in person, which requires significant human and financial resources to conduct. During the COVID-19 pandemic, some programs suspended interviewing, while other programs conducted virtual interviews. There are several commercially available platforms which programs may use to effectively employ either synchronous or asynchronous interviews. Having the option to run interviews virtually has had a positive impact on the financial impact of interviews on both the institution and the candidates.

Structured Interviews

Structured interviews are standardized, with the purpose of providing each candidate with a similar interview experience which can be quantitatively measured. Structured interview tools, such as MMIs, have more consistent psychometric measures than traditional interviews, and have been shown to be a reliable and valid interview tool (Patterson et al. 2016b). The MMI is a structured interview format which consists of a series of timed scenarios that each candidate will respond to. Each scenario is designed to assess nonacademic attributes that are relevant to the individual program's mission, beliefs, and values.

Unstructured Interviews

Unstructured interviews are still widely used in many veterinary admissions programs. Unstructured interview formats typically do not consist of a set of predetermined questions that will be asked of each individual candidate. While the process may be formal, the interaction between interviewer(s) and candidate(s) may vary between candidates. It has been demonstrated that unstructured interviews are not reliable and have poor predictive validity. Unstructured interviews are prone to bias and error, and therefore they may not be legally defensible (Patterson et al. 2016b).

Prior to implementation of any interview tool, careful consideration should be given to the overall goals and mission of the veterinary program, as well as how the interview format aligns with the curriculum.

Situational Judgment Tests

Since the 1970s, SJTs have been utilized in assessment in a variety of occupations, and in the last decade have been utilized in selection in the medical profession (Patterson et al. 2016a). In the UK and Belgium they are a component of the respective centralized application service of each country for selection into its medical programs, and in Australia and New Zealand are being used in the selection processes of a small number of medical programs.

SJTs are hypothetical scenarios created to assess the reactions and judgments of individuals in relation to specific personal attributes (Patterson et al. 2016a). There are multiple formats, from video to written, and the response options for the questions vary depending on the experience and age of the target applicants. It is a time-consuming, complex, and multistep process to develop bespoke high-quality SJT scenario questions. However, a key advantage of SJTs is that, once developed, they can be used to assess the personal attributes of large numbers of applicants. The initial research regarding their reliability and validity was promising, as is the acceptability to candidates (Lievens 2013; Patterson et al. 2016a).

At the time of publication of the first edition of this book, only one school was utilizing SJTs in their selection process. However, the SJT has become more common practice within veterinary student selection, aided by third-party providers who can deliver the development and administration of the SJT in a virtual format which further supports accessibility for all applicants. During the COVID-19 pandemic, multiple programs adopted the use of a commercially available, online SJT due to the difficulty of conducting interviews. Following COVID-19, some programs have continued to use it while others have not. It is imperative that admissions committees utilize the necessary resources to inform their members and construct their selection rubrics to appropriately use the SJT data.

Reviewing the Admission/Selection Process

There should be a mechanism in place to periodically evaluate the success of a program's admissions process. The "success" of an admissions process must be defined by individual programs based on their own goals and mission statements. Many program reviews may be simply accomplished through outcomes reporting on rates of attrition, graduation, and passing of board examinations. However, it is recommended that a more intensive review be conducted, since admissions decisions have a broader impact than just on an institution. The evaluation should be systematically performed and framed within program outcomes and measures, with the goal of determining the overall impact of student selection decisions on both stakeholders and the workforce. Veterinary programs should safeguard the fairness, transparency, defensibility, and psychometric properties of the student selection process. Additionally, consideration of the cost efficiency must be included in the evaluation.

The types of data collected will be program dependent, but should include both academic and nonacademic

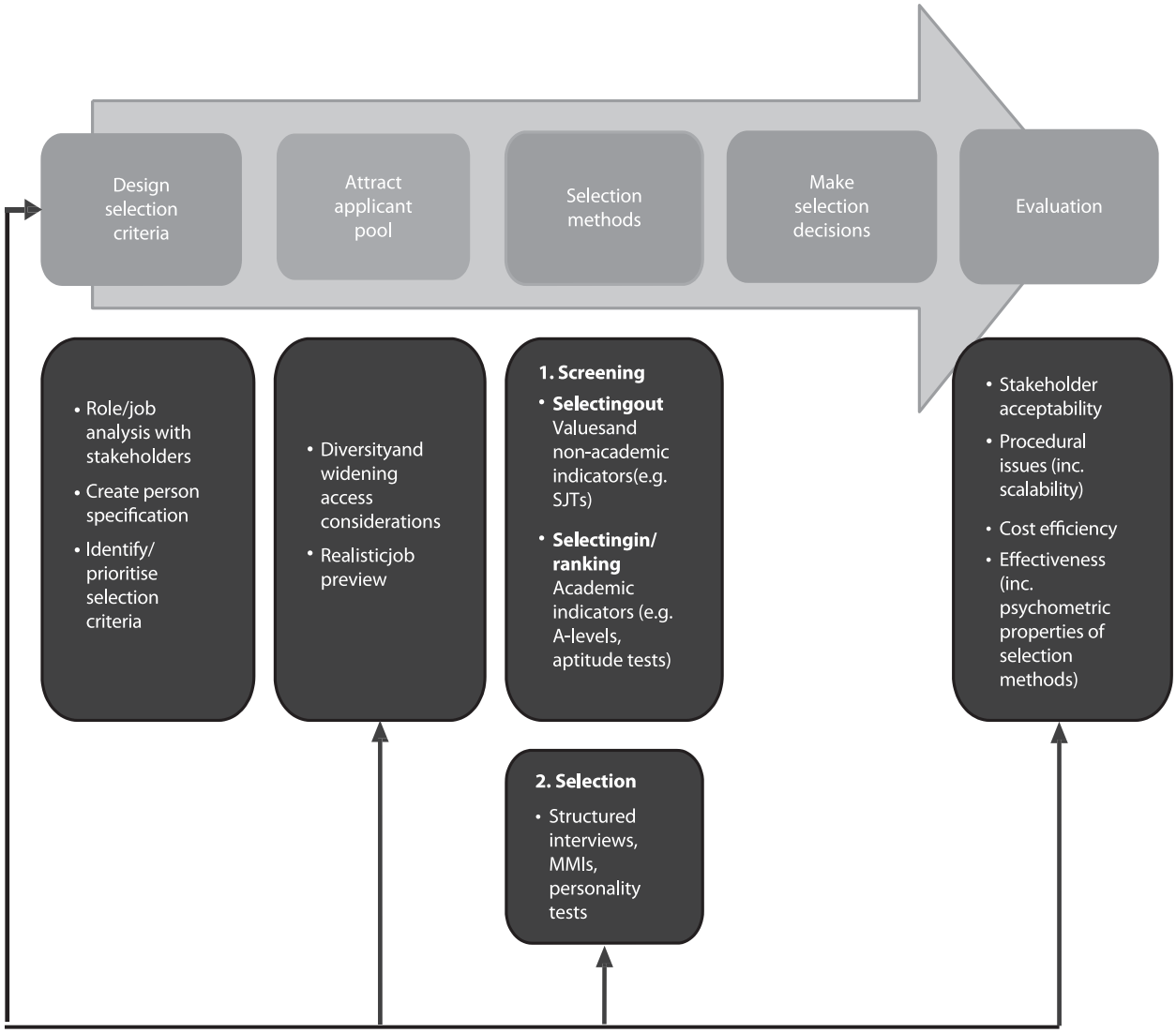

Figure 1.1 Design and evaluation of selection systems. MMIs = multiple mini interviews; SJTs = situational judgement tests. *Source:* Adapted from Patterson et al. (2016b) / John Wiley & Sons.

correlates. More than likely, all veterinary programs have an annual reporting system, which provides a brief overview of the outcomes of student selection. However, it is our opinion that a detailed review process should occur on a regular basis, to allow for collecting data on a seated class from matriculation to graduation. Programs should complete the review long before another admissions cycle begins to allow for implementation of any change. As veterinary programs have different titles for leaders within admissions offices, the individuals accountable for the student selection process should be responsible for leading the evaluation process. The admissions committee should be involved, as well as students and perhaps employers. Faculty should be made aware of any proposed changes prior to final implementation.

Figure 1.1 outlines a system for the development of a selection process, but we believe that the same principles apply to a thorough review of existing processes. We encourage selection committees to consider these guidelines in developing or reviewing their selection processes.

Looking Forward

The veterinary school admissions process often relies on tradition and assumptions, which are usually not transparent to the candidate and are founded in individual institutional historical culture and belief systems. Most programs still rely heavily on academic performance in selection processes. Of course, programs need to be assured of the academic capability of each applicant to handle the rigors of the program and professions. However, too often the academic performance standard is not set at a level predictive of success but rather is used