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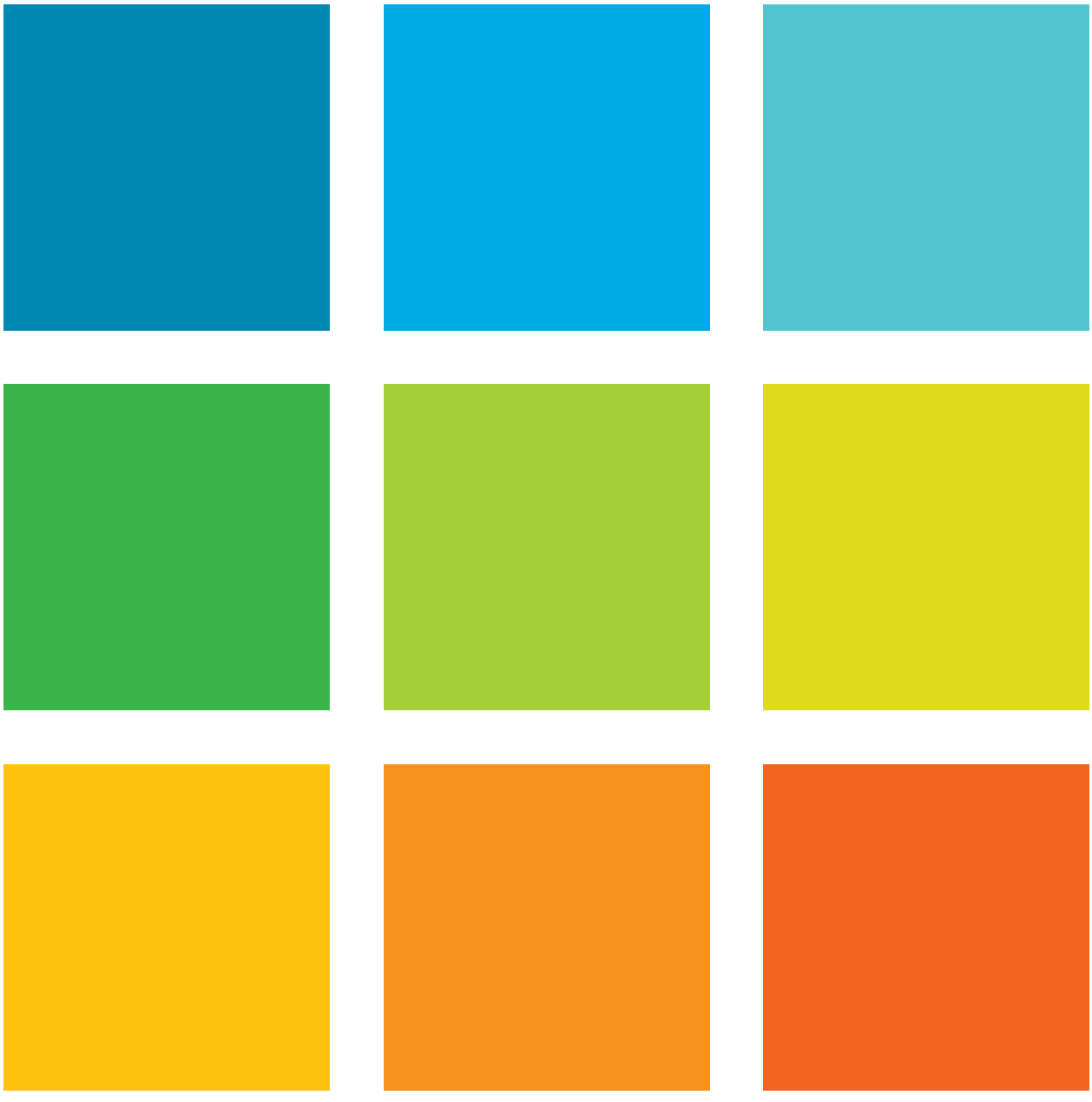
American Association of
Veterinary Medical Colleges

Competency-Based Veterinary Education:

CBVE 2.0



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AAVMC CBVE
Competency-Based Veterinary Education

Welcome to CBVE 2.0!

Competency-Based Veterinary Education (CBVE) is an approach modeled after competency-based medical education and is designed to prepare graduates for professional careers by confirming their ability to meet the needs of animals and the expectations of society. This approach focuses on outcomes-based and learner-centered education and assessment with the goal of optimizing new graduate success and patient outcomes.

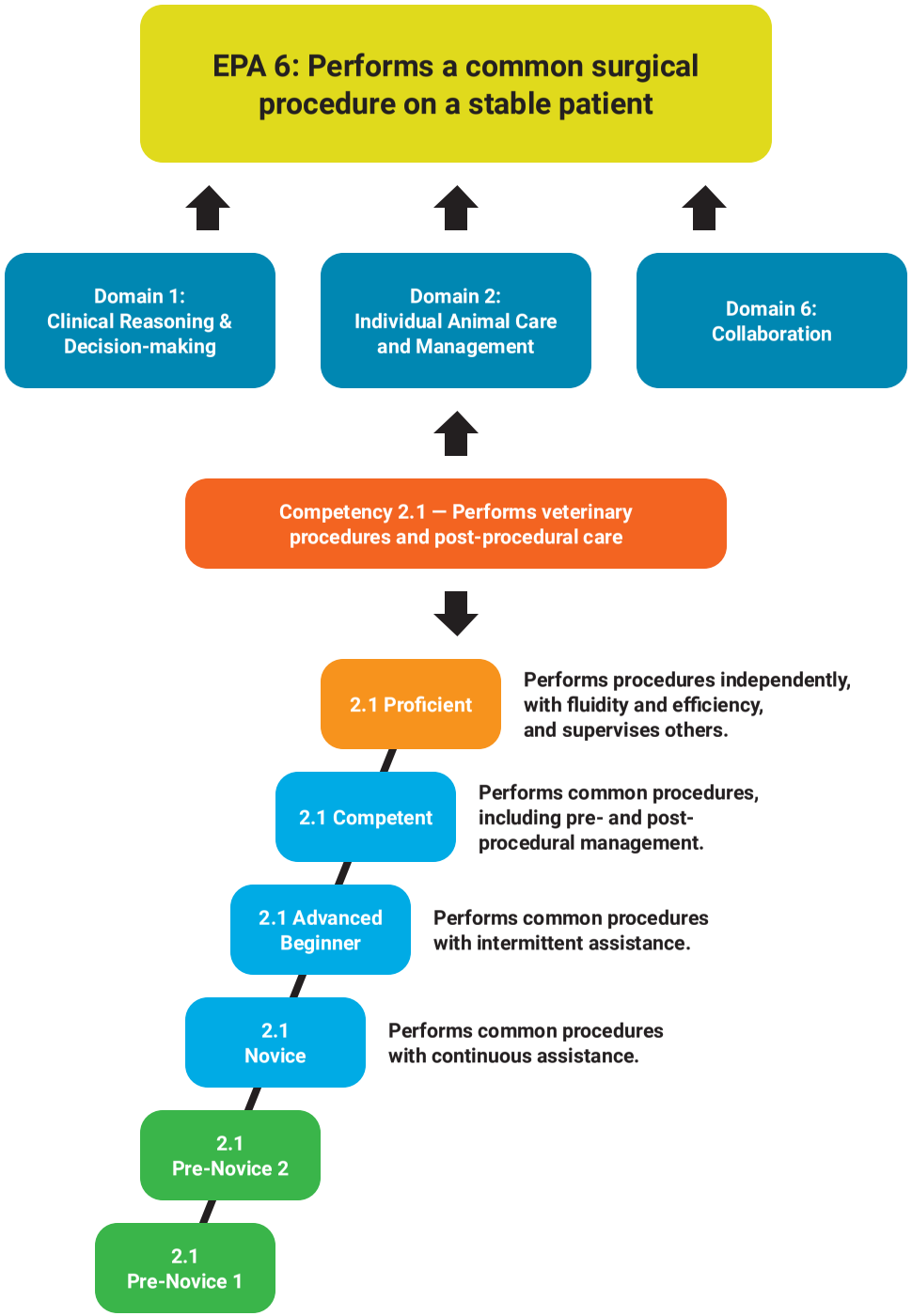
Originally published in 2018, the CBVE Model was designed by an international team of veterinary educators representing academic veterinary medicine from colleges and schools across the U.S., Canada, Europe, the U.K. and Australia. The AAVMC Council on Outcomes-based Veterinary Education (COVE) has continued to revise the model and support implementation of CBVE within programs around the world. This document represents the continued work of COVE and addresses stakeholder feedback based upon use of the model components since the original publication 6 years ago. All CBVE components and additional documents supporting implementation and assessment, as well as resources to support faculty development in outcomes-based education, may be found at **http://cbve.org**

The CBVE 2.0 Model is comprised of three primary components:

- CBVE Competency Framework
- CBVE Milestones
- CBVE Entrustable Professional Activities (EPAs)

This booklet will provide information on each of these components and the resources to support their use including recommendations for assessment and implementation of competency-based education in your program.

The relationships between these three components are demonstrated in the diagram on the following page.



Assessment

EPA → **EPA**

- Activity that allows opportunity for assessment using an entrustment-supervision scale
- Assessment of EPA provides holistic overview of learner performance
- EPAs are performed in authentic environment where the variables change frequently
- Multiple competencies from multiple domains are integrated at the same time into one clinical activity

Domains of Competence

Competency

Milestones → **ITER**

- Provides detailed feedback related to the learner's progression for each competency
- Helps determine where learner is struggling
- Demonstrates steps a learner can take to progress and improve

Key Definitions

Competency

An observable ability of a health professional related to a specific activity that integrates knowledge, skills, values, and attitudes. Since competencies are observable, they can be measured and assessed to ensure their acquisition.[1]

Domains of Competence (DOC)

Broad distinguishable areas of competence that in the aggregate constitute a general descriptive framework for a profession.[2]

Competency Framework

An organized and structured representation of a set of interrelated and purposeful competencies.[3]

Entrustable Professional Activity (EPA)

An essential task of a discipline that a learner can be trusted to perform with limited supervision in a given context and considering regulatory requirements, once sufficient competence has been demonstrated. (As adapted from[4])

Milestone

A defined, observable marker of an individual's ability along a developmental continuum.[4]

Programmatic Assessment

An intentionally designed assessment system (formative and summative) in which the longitudinal development of learning is visible to the student as actionable feedback and which provides rich data for informed holistic decision making on progression.[5]

1. Frank, J.R., Snell, L.S., Ten Cate, O., *et al.* (2010) Competency-based medical education: Theory to practice. *Medical Teacher*, 32(8), 638-645.
2. Englander, R., Cameron, T., Ballard, A.J., *et al.* (2013) Toward a common taxonomy of competency domains for health professions and competencies for physicians. *Academic Medicine*, 88(8), 1-7.
3. Willet T. (2012) Performance framework definitions [Internet]. [cited 2012 Dec 5]. Available from: http://groups.medbiq.org/medbiq/display/CWG/Performance+Framework+-+Definitions.
4. Englander, R., Frank, J.R., Carracio, C., *et al.* (2017) Toward a shared language for competency-based education. *Medical Teacher*, 39(6), 582-587.
5. Van der Vleuten, C., Lindemann I., and Schmidt L. (2018) Programmatic assessment: the process, rationale and evidence for modern evaluation approaches in medical education. Med J Aust. 2018 Nov 5;209(9):386-388.

Decoding the CBVE Model

To identify domains, competencies and subcompetencies, the following numbering system is used:

- First number indicates the domain;
- Second number identifies the specific competency within that domain;
- Last number is the specific subcompetency for that competency.

Example: 1.1.2

Domain 1 – Competency 1 – Subcompetency 2

When subcompetencies are not used there will only be two numbers, representing the domain and competency.

Example: 5.3

Domain 5 - Competency 3

Subcompetencies may be customized by a program whereas competencies and domains should be used as published to ensure standardization across veterinary educational programs.

Milestones refer to a specific competency and describe learning progression for that competency. They are labeled Pre-Novice 1, Pre-Novice 2, Novice, Advanced Beginner, Competent, and Proficient.

EPAs are always referred to as “EPA” followed by the number, for example EPA 1.

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Competency-Based Veterinary Education:

Competency Framework

CBVE: Competency Framework

The CBVE Competency Framework consists of nine domains of competence, each representing a group of related abilities necessary for veterinary graduates.

Associated with each domain is a list of competencies, all of which are considered core for veterinary graduates. The CBVE Competency Framework consists of 32 competencies, some of which lend themselves to assessment in the clinical context, while others may be best assessed in the pre-clinical curriculum.

To better describe each competency, illustrative subcompetencies are provided, which may be modified or refined by individual programs. Subcompetencies are more granular than competencies and can be used to develop course or rotation objectives and assessments or used to highlight specific areas of focus that align with a program's mission, context, or culture (see Implementation Strategies, page 82).

The competency framework should be the scaffold on which the curriculum and assessments are built. Learners should be assessed longitudinally across the program for each competency to ensure that graduates have achieved the necessary outcomes by the time of graduation. The CBVE Competency Framework guides teaching and learning to prepare graduates for successful careers in the veterinary profession.

CBVE: Domains of Competence

1		Clinical Reasoning and Decision-making
2		Individual Animal Care and Management
3		Animal Population Care and Management
4		Public Health
5		Communication
6		Collaboration
7		Professionalism and Professional Identity
8		Financial and Practice Management
9		Scholarship

DOMAIN 1

Clinical Reasoning and Decision-making

The graduate demonstrates critical thinking and problem solving to arrive at evidence-based decisions that consider animal and client needs, available resources, and social context.

COMPETENCIES		ILLUSTRATIVE SUBCOMPETENCIES
1.1	**Gathers and assimilates relevant information about animals**	1. Collects history 2. Performs physical examination 3. Interprets diagnostic test results 4. Performs necropsy examination
1.2	**Synthesizes and prioritizes problems to arrive at differential diagnoses**	1. Identifies problems 2. Creates refined problem list 3. Prioritizes differential diagnoses
1.3	**Creates and adjusts a diagnostic and/or treatment plan based on available evidence**	1. Appraises available clinical information and acts accordingly despite uncertainty 2. Explains justification for plan 3. Re-evaluates animal or population in a timely manner to adjust plan 4. Uses critical thinking to determine appropriate action when unexpected outcomes occur (e.g., complications, changed diagnosis)
1.4	**Incorporates animal welfare, client expectations, and economic considerations into the diagnostic or treatment plan**	1. Considers disease in context of the whole animal and client 2. Presents a range of options to the client 3. Considers euthanasia as a management option when appropriate
1.5	**Prioritizes situational urgency and allocates resources**	1. Triages cases to address most urgent and important problems first 2. Recognizes emergent situation and directs action
1.6	**Adapts knowledge to varied scenarios and contexts**	1. Extrapolates knowledge to novel species or situations 2. Adjusts existing protocol or procedure when standard measures are unavailable
1.7	**Recognizes limitations of knowledge, skills and resources and consults as needed**	1. Identifies situations in which referral is warranted 2. Consults experts both within and outside the veterinary profession

DOMAIN 2

Individual Animal Care and Management

The graduate performs preventive, diagnostic, medical and surgical procedures for the health, wellness and treatment of animals, appropriate to the context and life stage.

COMPETENCIES		ILLUSTRATIVE SUBCOMPETENCIES
2.1	**Performs veterinary procedures and post-procedural care**	1. Performs diagnostic procedures 2. Performs routine therapeutic procedures (e.g., administer fluids) 3. Performs elective procedures (e.g., castration) 4. Performs emergency procedures (e.g., establish an airway; perform cardiopulmonary cerebral resuscitation [CPCR]) 5. Provides analgesia and postoperative care 6. Anesthetizes and recovers patients 7. Manages patient comfort
2.2	**Promotes comprehensive wellness and preventive care**	1. Recommends disease prevention measures 2. Provides nutritional counseling appropriate to life stage and health status 3. Advises clients regarding routine dental care 4. Educates clients on prevention of common behavioral problems 5. Counsels clients about husbandry and welfare needs

DOMAIN 3

Animal Population Care and Management

The graduate designs and implements programs in herd/flock health, disease prevention and control to improve the health, welfare and productivity of animal populations.

COMPETENCIES		ILLUSTRATIVE SUBCOMPETENCIES
3.1	**Applies population management principles in compliance with legal regulations and economic realities**	1. Recommends disease prevention measures 2. Advises on nutritional management 3. Recommends housing and husbandry protocols 4. Designs therapeutic plans for disease management
3.2	**Recommends and evaluates protocols for biosecurity**	1. Develops isolation protocols 2. Selects disinfection protocols 3. Recommends protocols for animal movement
3.3	**Advises stakeholders on practices that promote animal welfare**	1. Advocates for animal welfare through communication of the physical, affective, and natural needs of the animal 2. Explains ethical and welfare-related aspects of production processes and slaughter 3. Recognizes proper handling and/or adequate facilities by interpretation of animal behaviors 4. Advises on animal husbandry and transport

DOMAIN 4

Public Health

The graduate responds to issues at the interface of animals, humans, and the environment, utilizing a global perspective and sensitivity to local cultures.

COMPETENCIES		ILLUSTRATIVE SUBCOMPETENCIES
4.1	**Recognizes zoonotic, transboundary, and emerging diseases and responds accordingly**	1. Identifies the clinical signs, clinical course, transmission potential and pathogen(s) associated with zoonotic, transboundary, and emerging diseases 2. Responds to disease diagnosis through owner education, reporting, quarantine, and disinfection
4.2	**Promotes the health and safety of people and the environment**	1. Makes recommendations for management of animal waste, carcasses, and by-products 2. Implements safety and infection control practices 3. Advises on disaster/emergency preparedness and response 4. Practices responsible use of antimicrobial agents 5. Describes the role of the veterinarian in food safety

DOMAIN 5

Communication

The graduate communicates effectively with diverse clients, colleagues, other healthcare professionals and the public to promote animal, human and environmental health and wellbeing.

COMPETENCIES		ILLUSTRATIVE SUBCOMPETENCIES
5.1	**Listens attentively and communicates professionally**	1. Uses appropriate terminology and approach for audience 2. Utilizes a variety of communication platforms to ensure effective communication and accessibility (e.g., email, talk to text)
5.2	**Adapts communication style to diverse audiences**	1. Demonstrates audience-centered communication 2. Elicits goals, expectations, perspectives and constraints, considering the human-animal bond 3. Engages in difficult conversations such as financial decisions and end-of-life care (e.g., palliative care and euthanasia)
5.3	**Prepares documentation/forms appropriate for the intended audience**	1. Records patient care information and communication using professional terminology 2. Ensures documentation fulfills professional and legal requirements

DOMAIN 6

Collaboration

The graduate collaborates with diverse colleagues, clients and other stakeholders and demonstrates skills as a leader and interprofessional team member to improve outcomes and reduce error.

COMPETENCIES		ILLUSTRATIVE SUBCOMPETENCIES
6.1	**Solicits, respects and integrates contributions from others**	1. Invites input from others irrespective of role, hierarchy or background 2. Acknowledges input and incorporates into ongoing plan of action 3. Leverages own role and roles of others to achieve shared goals 4. Engages colleagues to foster a culture of patient safety and error reduction
6.2	**Functions as leader or team member based on experience, skills and context**	1. Applies principles of teamwork 2. Bases action on collaborative input 3. Manages conflict
6.3	**Maintains ongoing relationships to provide continuity of collaborative effort**	1. Organizes documentation and communicates with collaborator in preparation for transfer or discharge 2. Follows up with collaborator to ensure implementation of care plan 3. Provides support through encouragement, education, or redirection to refine the plan of action
6.4	**Demonstrates inclusivity and cultural competence**	1. Demonstrates respect for diversity 2. Encourages diverse contributions within the workplace

DOMAIN 7

Professionalism and Professional Identity

The graduate demonstrates behaviors expected of the veterinarian, including ethical reasoning, reflective practice, self-regulation, professional development, and personal wellbeing.

COMPETENCIES		ILLUSTRATIVE SUBCOMPETENCIES
7.1	**Adopts an ethical approach to meeting professional obligations**	1. Applies an ethical approach to professional decision-making 2. Recognizes and responds to evidence of neglect and abuse
7.2	**Practices time management**	1. Recognizes impact of time management on stakeholders 2. Prioritizes and completes tasks according to importance and urgency
7.3	**Reflects on personal actions and uses feedback to plan improvement**	1. Practices self-reflection 2. Invites and responds to constructive feedback on performance 3. Critiques decision-making process and its outcomes
7.4	**Engages in self-directed learning**	1. Engages in self-directed learning as a foundation for life-long learning 2. Identifies and undertakes professional development to meet learning needs 3. Uses appropriate resources for learning and decision-making (e.g., information technology, consultation with colleagues)
7.5	**Attends to wellbeing of self and others**	1. Recognizes sources of workplace stress and acts to remedy adverse situations 2. Recognizes signs of stress in self and colleagues, engages in self-care and recognizes when professional support is appropriate for self or others 3. Manages expectations of client and self
7.6	**Engages in career planning**	1. Compares career paths and weighs professional and personal rewards (e.g., financial implications)

DOMAIN 8

Financial and Practice Management

The graduate utilizes business acumen to manage professional and personal decisions, complies with legal and regulatory requirements and ensures safety of the workplace.

COMPETENCIES		ILLUSTRATIVE SUBCOMPETENCIES
8.1	**Weighs financial factors in personal and business decision-making**	1. Applies financial principles to personal and professional decisions (e.g., debt repayment plan) 2. Explains work-related insurance (e.g., personal, professional, patient) 3. Describes relationship between revenue generation, expense categories, and compensation including benefits
8.2	**Delivers veterinary services compliant with legal and regulatory requirements**	1. Acts in accordance with codes of professional practice, veterinary practice acts and licensing board regulations (e.g., veterinarian-client-patient relationship) 2. Acts in accordance with legal and regulatory requirements (e.g., reportable diseases, animal cruelty, waste disposal) 3. Selects drugs in accordance with regulatory and legal requirements (e.g., controlled substances, extra-label drug use)
8.3	**Advocates for the health and safety of patients, clients, and members of the team within the workplace**	1. Complies with workplace health and safety regulations (e.g., radiation safety, infection control) 2. Applies safe practices for handling hazardous materials (e.g., administration of chemotherapeutic agents) 3. Identifies and addresses sources of medical error/adverse events

DOMAIN 9

Scholarship

The graduate demonstrates the systematic identification, evaluation, integration and adaptation of evidence and experience to formulate questions and solutions, and educate others.

COMPETENCIES		ILLUSTRATIVE SUBCOMPETENCIES
9.1	**Practices evidence-based veterinary medicine (EBVM)**	1. Formulates questions and customizes solutions, drawing on personal experience and available evidence 2. Retrieves, evaluates, and applies information to solve clinical or scientific problems 3. Applies creativity to develop innovative solutions
9.2	**Disseminates knowledge and practices to stakeholders**	1. Develops and disseminates educational materials 2. Explains evidence-based recommendations

Notes

Notes

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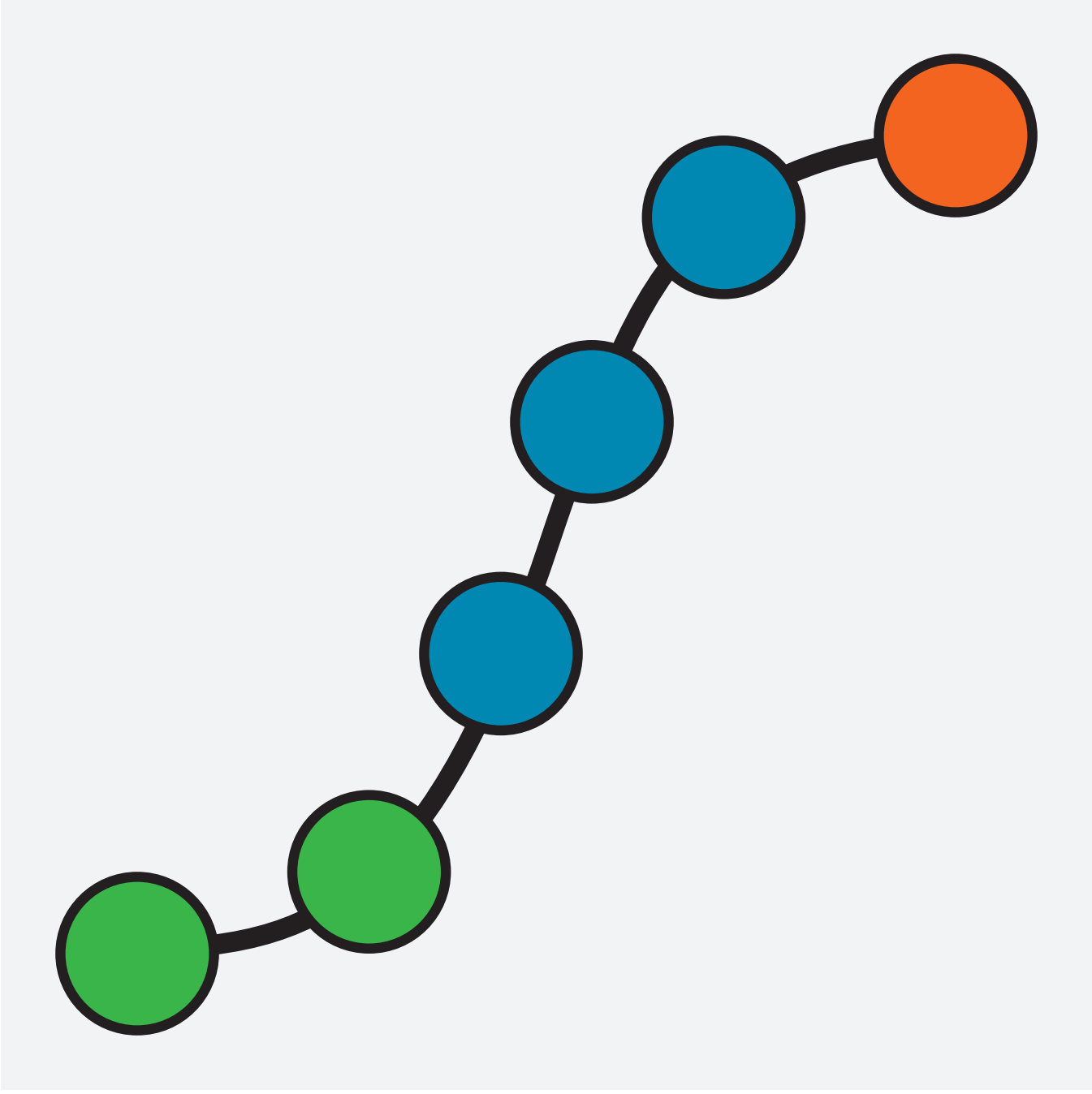
Competency-Based Veterinary Education:

Milestones



CBVE: Milestones

A milestone is an observable marker of an individual's ability along a developmental continuum. Using milestones to monitor the longitudinal progress of learners helps ensure preparation for independent practice at graduation. The CBVE Milestones are written at distinct levels to describe the expected performance along the trajectory of ability for each competency across the program. Veterinary education programs include pre-clinical instruction that provides the foundation to prepare students for patient management in the authentic workplace. Milestones for the pre-clinical curriculum are identified as Pre-Novice 1 and Pre-Novice 2 where learners are developing competence within controlled and simulated environments. The Novice milestone describes the level of learner development expected at the time of entry into an authentic workplace where variability and ambiguity are expected. In this environment, learners may initially regress because of the complexity encountered. Since the Novice milestone sets minimum expectations for a learner's entry into the authentic workplace, learners who have not yet reached the Novice milestone for a particular competency may require remediation prior to entry into the clinical environment. Conversely, some learners may enter clinical training at a milestone level higher than Novice. The Advanced Beginner milestone describes the expected development of competence during clinical training and helps ensure an individual is on an appropriate trajectory towards graduation. The Competent milestone describes the expectation for a learner's entry into their professional career. If this level is not achieved, learners require remediation prior to graduation. Although some learners may achieve the Proficient milestone during the veterinary medical training program, for most learners, this milestone provides a roadmap for continued development after graduation.

In medical education literature, competence is considered a stratified concept that builds upon itself as a learner progresses along the developmental continuum. The foundational, context-independent knowledge and skills that every professional should possess are illustrated in the Pre-Novice milestone descriptions. In the early phases of training, learners encounter simulated exercises within controlled learning environments. As the learner progresses to clinical training, the learning environment becomes context-dependent. In the clinical phase, the learner must consider many factors that are unique to a given case or set of circumstances (i.e., the authentic workplace). In the final phase following graduation, the professional develops personalized competence, or the art of practicing medicine, where they incorporate their own skills, interests, and habits into clinical practice. Here the achievement of proficiency corresponds with an aspirational goal usually achieved by a veterinary professional after some time in the professional work environment. Also critical to this final phase of development is the veterinarian's ability to incorporate broader perspectives. Milestones are written such that each developmental level builds on the previous one, i.e., it is assumed that the Advanced Beginner milestone includes all the behaviors described for the Novice milestone as well as those for the Advanced Beginner milestone; behaviors are not described again at subsequent levels. The milestones are written in a broad context to support demonstration of individual competencies across multiple workplace-based activities.

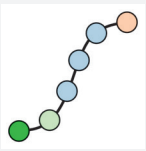
Milestones create a shared mental model for learners and educators regarding the progressive development of competence. The CBVE Milestones may be used to:

- Guide the progression of competence throughout a learner's training;
- Enable learners to focus their learning activities more effectively;
- Assist instructors in providing feedback to learners;
- Provide clearly defined targets to guide authentic learning and assessment;
- Enable assessors to determine when a learner has achieved a given milestone or set of milestones and is ready to move to the next phase of training.

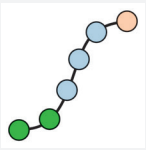
CBVE: Milestones

Narrative descriptions of expected learning progression for each CBVE Competency.

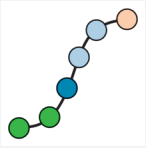
MILESTONES



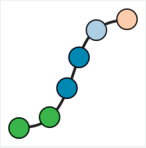
PRE-NOVICE 1:
Learner development expected from entry into the veterinary program and across the early phases of the training program



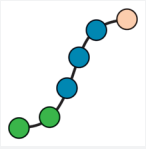
PRE-NOVICE 2:
Learner development expected from Pre-Novice 1 leading up to entry into the workplace environment



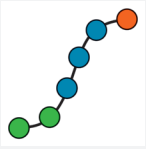
NOVICE:
The minimum expectation for entry to the authentic workplace



ADVANCED BEGINNER:
Developing competence



COMPETENT:
Expectation for entry into the professional career



PROFICIENT:
Aspirational expectation after some time in the workplace

1.1

COMPETENCY 1.1

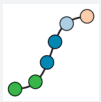
Gathers and assimilates relevant information about animals

MILESTONES

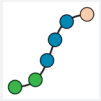
PRE-NOVICE 1:
Identifies behavior and body language that impact animal handling. Practices methods of patient handling and restraint in controlled environments with supervision. Obtains signalment and general history for healthy patients in simulated cases. Identifies normal form and function of animals. Performs components of general physical examination. Selects appropriate technique to collect samples for diagnostic testing. Performs point-of-care diagnostic tests.

PRE-NOVICE 2:
Selects appropriate method of restraint for animal and situation. Performs handling and restraint techniques safely and effectively. Performs disorganized and incomplete physical examination and describes findings. Differentiates normal from common/obvious abnormal physical exam findings. Selects correct test(s) to evaluate organ system(s). Interprets test results based upon pathophysiology of disease. Prioritizes selection of diagnostic tests based on their benefits and risks.

NOVICE:
May require assistance with animal handling and/or restraint in complicated, clinical cases. Poses history-taking questions from a template. Gathers insufficient, exhaustive, or irrelevant information. Performs complete physical examination. May lack systematic approach and/or overlook key findings. Interpretation of results rarely advances the plan.



ADVANCED BEGINNER:
Gathers relevant information. May omit details that support/refute common differential diagnoses. Physical examination follows a pattern but may overlook subtle findings. Identifies, describes, and documents major abnormalities. Interprets laboratory tests correctly most of the time; struggles to interpret conflicting results.



COMPETENT:
Handles patients effectively to minimize stress. Obtains pertinent history appropriate for the situation. Identifies and organizes historic elements consistent with common disorders. Performs thorough physical examination in a logical, fluid sequence, including systems-specific examinations. Identifies and documents most abnormal physical exam findings including subtle findings. Selects and interprets routine diagnostic tests appropriately. Ambiguous results are interpreted within case context to advance the plan.

PROFICIENT:
Recognizes variability in case presentation. Efficiently reviews results and recognizes unexpected findings to guide management of unusual cases.

1.2

COMPETENCY 1.2

Synthesizes and prioritizes problems to arrive at differential diagnoses

MILESTONES

PRE-NOVICE 1:
Explains components of the problem-oriented medical record (POMR) approach. Generates a rudimentary problem list given basic case information and identifies associated body systems and/or disease mechanisms in simulated cases.

PRE-NOVICE 2:
Refines problem list based on increasing case information. Generates differential diagnoses associated with body systems for common conditions.

NOVICE:
Focuses exclusively on the presenting complaint of clinical cases. List of differential diagnoses may not be prioritized, may include irrelevant conditions, and/or be limited in scope.

ADVANCED BEGINNER:
Develops a problem list that is accurate with occasional omissions. Differential list may be excessive, incomplete, and/or inadequately prioritized.

COMPETENT:
Consistently develops an accurate, prioritized problem list and differential list for common problems.

PROFICIENT:
Follows systematic procedure for synthesis, comparison, and evaluation of information. Quickly filters irrelevant information and identifies unknowns.

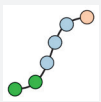
1.3

COMPETENCY 1.3

Creates and adjusts a diagnostic and/or treatment plan based on available evidence

MILESTONES

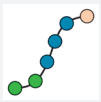
PRE-NOVICE 1:
Describes the physiologic basis and indications for conducting routine diagnostic tests and planning treatments.



PRE-NOVICE 2:
Evaluates simulated case scenario information, designs and justifies a basic diagnostic and/or treatment plan.

NOVICE:
Describes some components of a diagnostic and/or treatment plan but may not consider unique clinical patient data to develop a tailored plan. Reevaluates patient following implementation of plan only when prompted.

ADVANCED BEGINNER:
Generates diagnostic and/or treatment plans that incorporate elements of unique patient findings but are not comprehensive. Reevaluates situation and plan but may have difficulty integrating new information or dealing with uncertainty.



COMPETENT:
Develops comprehensive plan tailored to the animal, reevaluates information, and updates plan. Justifies case management decisions. Reviews and self corrects when initial conclusions are inaccurate.

PROFICIENT:
Articulates succinct and accurate explanations for decision-making. Makes evidence-based decisions in the face of ambiguous data. Promptly adjusts management plan based on available evidence.

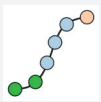
1.4

COMPETENCY 1.4

Incorporates animal welfare, client expectations, and economic considerations into the diagnostic or treatment plan

MILESTONES

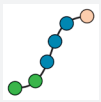
PRE-NOVICE 1:
Defines the principles of animal welfare and identifies the elements that impact animal quality of life. Identifies client factors, economic context, resources, and other constraints that influence animal care and productivity in simulated cases. Considers euthanasia as an option.



PRE-NOVICE 2:
Demonstrates a limited ability to adjust the diagnostic and management plan based on consideration of relevant factors. Lists possible reasons for client non-compliance. Assesses animal welfare on an individual and population level.

NOVICE:
Develops a diagnostic, treatment, and client education plan for clinical cases, but may not address all animal welfare and client factors, economic context, resources, and other constraints.

ADVANCED BEGINNER:
Presents a range of options, but may struggle to describe the advantages, logistics, and/or complications of each. Inconsistently considers client input in the plan.



COMPETENT:
Prioritizes a range of feasible management plans, including euthanasia, with consideration of the long-term health and welfare of the animal. Recognizes client limitations and respects their preferences. Provides clear explanations of the advantages, complications, and prognosis for each option.

PROFICIENT:
Empowers client to participate in the development of a comprehensive customized management plan for their animal, including palliative care. Incorporates available evidence and accurately predicts the expense and value for each option. Functions well in resource-poor environment.

1.5

COMPETENCY 1.5

Prioritizes situational urgency and allocates resources

MILESTONES

PRE-NOVICE 1:
Identifies alterations in homeostatic mechanisms that threaten life. Describes clinical findings that require triage.

PRE-NOVICE 2:
Develops a plan to restore homeostasis in simulated cases. Identifies resources needed to implement the plan.

NOVICE:
Recognizes overt life-threatening situations in clincal cases, but may not respond urgently. May not recognize changes in patient status. Requires asssitance to develop plan to stabilize an emergent patient.

ADVANCED BEGINNER:
Recognizes urgent situations. Develops plan for triage. Limited ability to recognize changes in patient status that require immediate intervention.

COMPETENT:
Reevaluates patient or situation continuously. Recognizes change in patient status warranting escalating care. Calls for assistance and works with team members/resources to provide care.

PROFICIENT:
Efficiently triages emergent and urgent patients. Directs team and prioritizes activites to align with available resources.

1.6

COMPETENCY 1.6
Adapts knowledge to varied scenarios and contexts

MILESTONES

PRE-NOVICE 1:
Identifies key similarities and differences (e.g., anatomy, physiology, immunology, pathology) between species that are relevant to case management.

PRE-NOVICE 2:
Applies knowledge learned in one context to a context that may be unfamiliar in simulated cases.

NOVICE:
Employs a standardized approach to clinical patient management. Variation in species and/or circumstances may present a barrier.

ADVANCED BEGINNER:
Recognizes variations in species or situation. Inconsistently adapts plan when circumstances vary from routine.

COMPETENT:
Draws inferences across species and circumstances to solve clinical problems in routine situations.

PROFICIENT:
Solves problems in novel situations. Creates solutions for gaps in care.

1.7

COMPETENCY 1.7

Recognizes limitations of knowledge, skills and resources and consults as needed

MILESTONES

PRE-NOVICE 1:
Differentiates between primary and specialty care.

PRE-NOVICE 2:
Recognizes situations and/or limitations that may require referral in simulated cases. Identifies resources for consultation and support.

NOVICE:
May underestimate or overestimate own abilities in the workplace. May lack awareness of resource limitations. Reluctant to reveal shortcomings or seek advice from others.

ADVANCED BEGINNER:
Recognizes some limitations but overestimates other abilities. Requires assistance in utilizing resources for consultation and/or referral.

COMPETENT:
Recognizes own limitations. Usually seeks guidance when warranted. Occasionally delays timely consultation and/or referral.

PROFICIENT:
Anticipates the need for consultation and proactively pursues consultation and/or referral.

2.1

COMPETENCY 2.1
Performs veterinary procedures and post-procedural care

MILESTONES

PRE-NOVICE 1:
Identifies relevant anatomical structures for common veterinary procedures. Performs individual components of procedure on models and/or specimens. Describes the physiology and pharmacology of analgesics and anesthestics.

PRE-NOVICE 2:
Identifies indications and contraindications for a procedure. Demonstrates aseptic technique. Performs procedure by combining multiple components on models and/or live animals in a laboratory setting. Designs analgesic and anesthetic protocols with assistance.

NOVICE:
Performs common procedures with continuous assistance and direct supervision in the workplace. Assists in pre- and post-procedural care. Administers analgesics and anesthetics with supervision.

ADVANCED BEGINNER:
Performs common procedures with intermittent assistance and direct supervision. Limited ability to take corrective action. Initiates limited pre- and post-procedural care.

COMPETENT:
Performs common procedures, including pre- and post-procedural management, without direct supervision but with support available if needed. Takes corrective action as warranted.

PROFICIENT:
Performs procedures independently. Demonstrates fluidity and efficiency in procedural performance. Supervises others in performing procedures.

2.2

COMPETENCY 2.2

Promotes comprehensive wellness and preventive care

MILESTONES

PRE-NOVICE 1:
Describes factors used to assess animal health, welfare and productivity (e.g., physical condition, nutritional status, behavior, breed, performance). Describes husbandry practices for common domestic species.

PRE-NOVICE 2:
Evaluates animal-specific factors and husbandry and management practices for impact on animal health, welfare and productivity in simulated cases. Advises on routine health management in a given scenario.

NOVICE:
Develops preventive care plan for clinical cases based on knowledge of relevant factors related to health and wellbeing. Plan may lack specificity and/or completeness. May struggle to communicate the plan.

ADVANCED BEGINNER:
Informs client of wellness/preventive care plan recommendations but explains benefits and importance only if asked. Readily ends wellness-focused discussion if client disengages or expresses indifference.

COMPETENT:
Presents a comprehensive wellness/preventive care plan including justification for each component. Answers client questions thoroughly and confidently and promotes patient and client benefits.

PROFICIENT:
Engages the client in selecting a comprehensive wellness/preventive care plan. Helps client prioritize healthcare options when resources are limited.

3.1

COMPETENCY 3.1

Applies population management principles in compliance with legal regulations and economic realities

MILESTONES

PRE-NOVICE 1:
Describes normal husbandry practices for animal populations. Identifies situations that require intervention to improve animal health and productivity.

PRE-NOVICE 2:
Identifies animal health and production goals relevant to given context in simulated cases. Evaluates possible interventions including associated costs, benefits and regulatory factors to meet goals.

NOVICE:
Creates population management plan with limited consideration of economic and regulatory factors in clinical cases.

ADVANCED BEGINNER:
Creates population management plan that considers economic and legal factors. Practices data analysis with assistance.

COMPETENT:
Analyzes population data to identify common problems and articulates potential solutions including economic and regulatory considerations.

PROFICIENT:
Evaluates population data to solve increasingly complex problems with realistic solutions tailored to population and/or client needs.

3.2

COMPETENCY 3.2

Recommends and evaluates protocols for biosecurity

MILESTONES

PRE-NOVICE 1:
Uses specified PPE and practices hygiene in simulated or laboratory settings.

PRE-NOVICE 2:
Explains the importance of biosecurity in prevention of disease spread. Describes the components of biosecurity protocols and explains the rationale for their use.

NOVICE:
Applies existing biosecurity protocol in the workplace.

ADVANCED BEGINNER:
Recommends and applies biosecurity protocol with assistance. Identifies errors while implementing and self-corrects.

COMPETENT:
Develops biosecurity protocols for common diseases and evaluates their effectiveness.

PROFICIENT:
Evaluates and advises on biosecurity protocols in varied situations (e.g., less common diseases or wide geographic area).

3.3

COMPETENCY 3.3
Advises stakeholders on practices that promote animal welfare

MILESTONES

PRE-NOVICE 1:
Describes the five domains of animal welfare. Lists examples of indicators that can be used to assess animal welfare.

PRE-NOVICE 2:
Assesses animal management systems and identifies welfare concerns in simulated cases.

NOVICE:
Recognizes animal welfare concerns in clinical cases and identifies strategies to mitigate them.

ADVANCED BEGINNER:
Identifies strategies to enhance animal welfare. May have difficulty promoting these strategies to stakeholders.

COMPETENT:
Advocates for animals and advises stakeholders regarding strategies to enhance welfare.

PROFICIENT:
Engages the local community and profession as an advocate for animal welfare. Promotes strategies in the face of opposition.

4.1

COMPETENCY 4.1

Recognizes zoonotic, transboundary, and emerging diseases and responds accordingly

MILESTONES

PRE-NOVICE 1:
Defines zoonoses and transboundary diseases. Identifies the pathobiology of the agents involved in animals and humans. Describes methods to protect self and others from zoonotic disease transmission.

PRE-NOVICE 2:
Explains the public health implications of zoonotic infections. Lists zoonotic and transboundary diseases that are reportable and the agencies involved in the reporting process.

NOVICE:
Identifies clinical signs associated with common zoonotic and transboundary diseases in clinical cases. Takes appropriate barrier precautions.

ADVANCED BEGINNER:
Lists zoonotic and transboundary diseases as differential diagnoses when appropriate. Seeks help in developing appropriate action plans including barrier precautions and reporting.

COMPETENT:
Identifies common zoonotic and transboundary diseases consistently. Develops and helps implement a management plan, including reporting. Instructs others in barrier precautions.

PROFICIENT:
Distinguishes atypical presentations of zoonotic and transboundary diseases across a range of species and coordinates control measures.

4.2

COMPETENCY 4.2

Promotes the health and safety of people and the environment

MILESTONES

PRE-NOVICE 1:
Identifies how animals impact the health and safety of people and the environment. Describes the role of the veterinarian in protecting public and environmental health.

PRE-NOVICE 2:
Lists methods for the promotion of health and safety of people and the environment (e.g., antimicrobial stewardship). Identifies strategies for implementation in simulated cases.

NOVICE:
Follows health and safety practices with assistance in the workplace.

ADVANCED BEGINNER:
Participates in health and safety practices.

COMPETENT:
Evaluates and recommends health and safety practices.

PROFICIENT:
Develops health and safety practices for novel or unexpected situations.

5.1

COMPETENCY 5.1
Listens attentively and communicates professionally

MILESTONES

PRE-NOVICE 1:
Inconsistently uses active listening and other core communication skills in simulations. May not select appropriate platform for communication delivery. May struggle to convey information clearly and professionally.

PRE-NOVICE 2:
Selects an appropriate communication platform. Consistently demonstrates active listening and core communication skills in simulations.

NOVICE:
Communicates primarily unidirectionally with limited active listening. Communicates well with scripted plan but may falter when confronted with unexpected variables in the workplace.

ADVANCED BEGINNER:
Actively listens and fosters bidirectional communication in most situations.

COMPETENT:
Consistently communicates bidirectionally and professionally.

PROFICIENT:
Communicates with confidence and ease regardless of situation.

5.2

COMPETENCY 5.2

Adapts communication style to diverse audiences

MILESTONES

PRE-NOVICE 1:
Explains the importance of relationship-centered communication. Describes the variety of communication styles. Inconsistently uses correct terminology for audience in simulations.

PRE-NOVICE 2:
Uses core communciation skills to practice relationship-centered communication. Adapts terminology to audience.

NOVICE:
Defaults to a single communication style regardless of audience in the workplace. Often makes assumptions rather than eliciting perspectives from others. May not adapt terminology to audience.

ADVANCED BEGINNER:
Inconsistently uses appropriate terminology. Occasionally elicits others' perspectives. Attempts to adapt communication style to meet the needs of others.

COMPETENT:
Routinely elicits perspectives, expectations, and concerns of others. Adapts communication to audience.

PROFICIENT:
Readliy adapts the communication to audience needs, even in difficult situations. Anticipates areas of concern and explains proactively.

5.3

COMPETENCY 5.3

Prepares documentation/forms appropriate for the intended audience

MILESTONES

PRE-NOVICE 1:
Describes documents used by veterinary professionals to record patient care and fulfill professional and legal requirements. Identifies the legal requirements of a given jurisdiction.

PRE-NOVICE 2:
Records medical information in simulated activities but may be incomplete. Terminology may not be appropriate for type of document.

NOVICE:
Records relevant information inconsistently (e.g., poorly organized, illegible, incomplete, irrelevant, or late) for clinical cases. May require point-by-point direction to complete forms.

ADVANCED BEGINNER:
Records most relevant information. Documents may require revision to correct inaccuracies or legibility. Terminology is usually appropriate for the document. Completes forms correctly with guidance.

COMPETENT:
Creates documents that are accurate, timely, legible and complete. Completes forms independently.

PROFICIENT:
Records information thoroughly and concisely.

6.1

COMPETENCY 6.1

Solicits, respects and integrates contributions from others

MILESTONES

PRE-NOVICE 1:
Acknowledges that there are different roles for team members. Describes how each role contributes to project completion.

PRE-NOVICE 2:
Contributes as a team member and integrates contributions from others to complete a defined project.

NOVICE:
Transitions between different team roles with guidance in the workplace. May disregard contributions from those perceived to have less authority.

ADVANCED BEGINNER:
Demonstrates respect for input from others but may not always incorporate input to advance team goals.

COMPETENT:
Considers team goals. Solicits and incorporates input from others to advance team goals.

PROFICIENT:
Demonstrates mutual respect and prioritizes team goals based upon input from all team members.

6.2

COMPETENCY 6.2
Functions as leader or team member based on experience, skills and context

MILESTONES

PRE-NOVICE 1:
Describes team roles and principles of effective teamwork.

PRE-NOVICE 2:
Practices team roles and applies principles of teamwork during group learning.

NOVICE:
Performs in assigned team role and depends on others for direction in the workplace. Identifies conflict and may not engage productively.

ADVANCED BEGINNER:
Functions independently in assigned team role in routine situations. Engages in productive conflict management with guidance.

COMPETENT:
Adapts own roles and responsibilities as needed to meet team goals. Engages in productive conflict management.

PROFICIENT:
Manages roles and responsibilities of others to meet team goals and leverages team member strengths. Mediates conflict between team members.

6.3

COMPETENCY 6.3

Maintains ongoing relationships to provide continuity of collaborative effort

MILESTONES

PRE-NOVICE 1:
Describes information to be included in structured communication protocol and the communication skills that promote continuity of care.

PRE-NOVICE 2:
Applies structured communication protocol in standardized cases. Uses appropriate communication skills to enhance continuity of care.

NOVICE:
Has difficulty selecting key information required for continuity of clinical care. Conveys information without checking for understanding.

ADVANCED BEGINNER:
Requires guidance to use a structured protocol to communicate key information and check for understanding to ensure continuity of care.

COMPETENT:
Uses a structured protocol to communicate key information in the workplace. Verifies understanding between and among the veterinary care team and clients.

PROFICIENT:
Expands patient care team when appropriate and educates others to improve outcomes and reduce errors. Adapts role to ensure continuity of care.

6.4

COMPETENCY 6.4

Demonstrates inclusivity and cultural competence

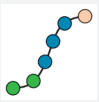
MILESTONES

PRE-NOVICE 1:
Defines cultural humility and its impact on self, others, and the workplace.

PRE-NOVICE 2:
Explains the value of a diverse team. Applies the principles of cultural humility to strengthen team processes and cultivate belonging in pre-clinical contexts/environments.

NOVICE:
Seeks and acknowledges diverse perspectives of others in the workplace.

ADVANCED BEGINNER:
Incorporates diverse perspectives in decisions and acts as an ally with encouragement.



COMPETENT:
Acts with cultural competence.

PROFICIENT:
Encourages, acknowledges and accepts diverse contributions of others and promotes inclusivity.

7.1

COMPETENCY 7.1

Adopts an ethical approach to meeting professional obligations

MILESTONES

PRE-NOVICE 1:
Describes ethical decision-making frameworks used in veterinary medicine. Identifies ethical dilemmas in scenarios. Describes aspects of professionalism important to veterinarians.

PRE-NOVICE 2:
Applies ethical decision-making framework to hypothetical scenarios and reflects on the outcomes.

NOVICE:
Approach to ethical decision-making may not be comprehensive or context-specific in the workplace.

ADVANCED BEGINNER:
Applies an ethical decision-making framework with assistance in varied contexts.

COMPETENT:
Demonstrates accountability by taking action on ethical issues. Maintains ethical behavior regardless of the setting or circumstances.

PROFICIENT:
Models professional behavior and leads ethical discussions through engagement with others.

7.2

COMPETENCY 7.2
Practices time management

MILESTONES

PRE-NOVICE 1:
Has difficulty managing time in the professional curriculum. May overestimate or underestimate the time for completion of tasks and/or demonstrate poor prioritization of tasks.

PRE-NOVICE 2:
Manages time to meet deadlines and responsibilities. Communicates promptly when unable to meet deadlines. Demonstrates the ability to prioritize tasks and responsibilities in simulated environments.

NOVICE:
May need assistance organizing and prioritizing tasks and responsibilities in the workplace. Utilizes a personalized time management plan to reduce impact on stakeholders.

ADVANCED BEGINNER:
Functions well in a slow-paced clinical setting. Organizes and prioritizes tasks independently but lacks efficiency.

COMPETENT:
Organizes and prioritizes tasks and responsibilities according to importance and urgency.

PROFICIENT:
Focuses on planning ahead, being proactive, and optimizing productivity of self and others. Successfully manages interruptions or distractions.

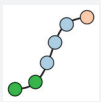
7.3

COMPETENCY 7.3

Reflects on personal actions and uses feedback to plan improvement

MILESTONES

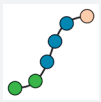
PRE-NOVICE 1:
Describes the importance of self-reflection for the development of professional identity. Describes effective strategies for inviting and providing constructive feedback. Reflects on own learning.



PRE-NOVICE 2:
Gives, receives, reflects on and uses constructive feedback during group learning. Reflects on experiences and develops action plan.

NOVICE:
Demonstrates difficulty asking for feedback in the workplace. When provided, able to accept constructive feedback, but may not always modify behavior.

ADVANCED BEGINNER:
Invites and uses feedback for accurate self-assessment in the workplace.



COMPETENT:
Applies reflective practice regularly for self-improvement.

PROFICIENT:
Serves as a role model and encourages others to engage in reflective practice. Demonstrates emotional intelligence and self-awareness.

7.4

COMPETENCY 7.4
Engages in self-directed learning

MILESTONES

PRE-NOVICE 1:
Identifies and utilizes resources to support learning. Develops study plan.

PRE-NOVICE 2:
Reflects on learning and adapts study plan.

NOVICE:
Identifies gaps in ability to integrate and apply knowledge and skills in the clinical context. Seeks instructor guidance on prioritizing learning needs rather than searching for answers independently.

ADVANCED BEGINNER:
Recognizes gaps in knowledge and skills relevant to management of patients and remedies these promptly. Consults easily accessible/familiar resources but requires prompting to expand depth of investigation.

COMPETENT:
Confidently identifies gaps and focused areas for professional development. Seeks and uses feedback and self-corrects using reliable sources.

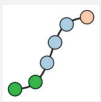
PROFICIENT:
Reads the literature consistently and applies it professionally.

7.5

COMPETENCY 7.5
Attends to wellbeing of self and others

MILESTONES

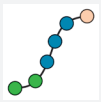
PRE-NOVICE 1:
Describes components of self care for personal wellbeing and identifies and evaluates preferred strategies. Identifies the signs of stress and failure to cope in self and others. Identifies personal limits and explains the importance of setting boundaries.



PRE-NOVICE 2:
Practices a range of coping strategies to deal with common pre-clinical stressors (e.g., examinations). Sets personal boundaries, describes triggers/indicators in self and others and recognizes when professional support is needed. Identifies situations that require an emergency response.

NOVICE:
Applies self-care and wellbeing practices in the workplace but can become overwhelmed. May have difficulty maintaining boundaries.

ADVANCED BEGINNER:
Practices habits that promote wellbeing in self and others. Adapts boundaries depending upon context. Recognizes and normalizes the need for professional support.



COMPETENT:
Utilizes a range of effective coping strategies in the face of difficult circumstances. Recognizes and responds to expectations of stakeholders (e.g., clients, supervisors) while maintaining boundaries.

PROFICIENT:
Promotes a healthy workplace culture. Reaches out to others exhibiting signs of stress and provides resources for professional help.

7.6

COMPETENCY 7.6
Engages in career planning

MILESTONES

PRE-NOVICE 1:
Describes a range of career opportunities for veterinarians.

PRE-NOVICE 2:
Investigates career options related to financial goals. Develops resume.

NOVICE:
Investigates career opportunities, consults mentors, and seeks experiences in interest areas.

ADVANCED BEGINNER:
Plans and completes experiences to strengthen expertise and expand networks for chosen career path. Balances financial realities with professional goals in career planning.

COMPETENT:
Prepares application materials, selects job opportunities consistent with career goals, and reflects on interviews.

PROFICIENT:
Commits to professional and personal development strategies to achieve aspirational career goals. Integrates financial considerations into long term professional development and career planning.

8.1

COMPETENCY 8.1

Weighs financial factors in personal and business decision-making

MILESTONES

PRE-NOVICE 1:
Describes relevant financial factors associated with an education in veterinary medicine (e.g., debt-to-income ratio, cost of education). Develops a personal budget. Explains insurance categories relevant to the veterinary professional (e.g., disability, liability, malpractice).

PRE-NOVICE 2:
Identifies personal and professional priorities related to financial conditions. Adapts personal budget to changing circumstances. Describes employment benefits and methods of compensation (e.g., pro-sal, salary, etc.)

NOVICE:
Describes financial and business principles for veterinary practice but may have difficulty applying them. Identifies the factors considered in determining fees.

ADVANCED BEGINNER:
Develops an evidence-based personal financial plan including loan repayment. Explains fees for standard preventative veterinary care and common procedures or surgeries (e.g., dentistry, ovariohysterectomy).

COMPETENT:
Considers economic implications when making professional decisions. Negotiates compensation, including seeking assistance from professional counsel to refine financial plan and contract. Identifies charges that reflect veterinary services rendered, adapting information to geographic and socioeconomic settings.

PROFICIENT:
Considers financial factors when creating a plan to achieve goals for self and workplace.

8.2

COMPETENCY 8.2

Delivers veterinary services compliant with legal and regulatory requirements

MILESTONES

PRE-NOVICE 1:
Defines Veterinarian-Client-Patient Relationship (VCPR). Retrieves relevant rules and standards at state and federal levels. Finds drug label information.

PRE-NOVICE 2:
Explains the importance of the VCPR in ensuring legal and regulatory compliance. Evaluates compliance with relevant rules and standards in scenarios. Interprets drug label information.

NOVICE:
May suggest actions that incompletely comply with legal and regulatory requirements for clinical cases and may struggle to explain requirements.

ADVANCED BEGINNER:
Explains regulatory standards for veterinary practice but may struggle to apply.

COMPETENT:
Follows legal and regulatory standards consistently.

PROFICIENT:
Supervises team members to ensure compliance with legal and regulatory requirements. Identifies solutions to ensure operational compliance.

8.3

COMPETENCY 8.3

Advocates for the health and safety of patients, clients, and members of the team within the workplace

MILESTONES

PRE-NOVICE 1:
Finds and retrieves information about workplace health and safety regulations. Defines workplace hazards and methods to avoid.

PRE-NOVICE 2:
Identifies workplace hazards and appropriate authorities to whom hazardous materials safety breach should be reported in simulations.

NOVICE:
Inconsistently complies with posted protocols in the workplace and has difficulty explaining rationale.

ADVANCED BEGINNER:
Complies with posted protocols and explains rationale.

COMPETENT:
Identifies risks and applies appropriate health and safety protocols. Advocates for workplace safety.

PROFICIENT:
Provides direction to others to maintain health and safety and holds others accountable.

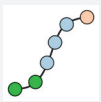
9.1

COMPETENCY 9.1

Practices evidence-based veterinary medicine (EBVM)

MILESTONES

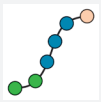
PRE-NOVICE 1:
Defines EBVM. Requires guidance to formulate relevant questions in simulated situations. Identifies a variety of sources for finding relevant, reliable information. Describes key criteria of resources (e.g., currency, relevance, and authority). Describes basic study designs and the elements of a scientific publication.



PRE-NOVICE 2:
Acquires scientific literature related to the question asked. Differentiates quality of sources and selects relevant information. Identifies and justifies basic conclusions from literature. Independent analysis of information is not consistently accurate.

NOVICE:
Identifies knowledge gaps, formulates relevant questions, and creates plans for addressing. Limited ability to use evidence-based data to solve problems. Needs guidance developing comprehensive solutions.

ADVANCED BEGINNER:
Requires guidance to select and apply the best evidence to a given setting. Inconsistently translates information from common to novel situations.



COMPETENT:
Consistently translates information across settings. Incorporates evidence and experience to solve common problems.

PROFICIENT:
Seeks evidence-based recommendations and engages in an iterative process of adaptation and improvement. Recognizes novel problems and customizes innovative solutions.

9.2

COMPETENCY 9.2

Disseminates knowledge and practices to stakeholders

MILESTONES

PRE-NOVICE 1:
Identifies and communicates information that may not be complete or relevant. Presentations may lack organization and clarity.

PRE-NOVICE 2:
Provides information but may not match the needs of the audience.

NOVICE:
Provides anecdotal information without verification from evidence-based sources. Educational materials may lack a clear message.

ADVANCED BEGINNER:
Creates educational materials that are accurate, but may not be context appropriate.

COMPETENT:
Creates and presents educational materials that advance knowledge for stakeholders.

PROFICIENT:
Engages stakeholders to determine needs. Disseminates tailored educational materials and assesses impact.

Notes

AAVMC
CBVE
Competency-Based
Veterinary Education

Competency-Based Veterinary Education:
Entrustable Professional Activities (EPAs)

CBVE: Entrustable Professional Activities (EPAs)

Entrustable Professional Activities are essential activities that veterinarians perform in the workplace. These activities are described at a high level so that they can be performed and observed in variable contexts (e.g., different species, clients, settings).

EPAs are:

- Complex activities that require integration of multiple competencies from multiple domains and are performed in the authentic workplace environment.
- Observable activities with a defined beginning and end.
- Activities that require learners to take responsibility for their decisions where there are real consequences.
- Activities learners should be entrusted to perform independently at the time of graduation.

EPAs are not:

- Activities for which specialized training or experience beyond veterinary school is required in order to perform.
- Activities that are performed in a simulated environment.
- Simple skills or activities that require only one competency.

There are eight EPAs published within the CBVE Model. These EPAs are considered core for all veterinary graduates. Schools may create additional EPAs that are important to their local context, but the total number of EPAs should be limited (8-12) to ensure that each student can be assessed performing each EPA multiple times across clinical training.

EPAs can be used to provide formative and/or summative assessment opportunities for learners and often contribute to a program of assessment. Assessment of a learner's ability to perform an EPA represents a snapshot in time; EPAs are most effective when used across the clinical training experience in a variety of contexts and are useful in assessing longitudinal progression of an individual learner.

Entrustment-supervision (ES) scales are commonly used to assess a learner's ability to perform an EPA independently. ES scales can be employed retrospectively, where evaluators report the level of supervision required for the learner to perform the activity or prospectively, where evaluators report how much trust they would place in the learner if performing the same task again.

Assessment of EPAs requires direct observation of the learner performing the EPA. In some cases, it may be more practical to observe a portion of the EPA, a subsection of the activity which can be assessed independently from the rest of the EPA (i.e., nested EPA). An example is EPA 1: Gathers a history, performs an examination and creates a prioritized differential diagnosis list. In clinical training, EPA 1 may be divided into separate nested EPAs: 1a. Gathers a history; 1b. Performs an examination; 1c. Creates a prioritized differential diagnosis list. A learner could be observed performing nested EPA 1a on one patient and nested EPA 1b on a different patient.

Guide to this section:

Each EPA is summarized and followed by a more detailed commentary about the activity to help readers understand the context. The relationship between each EPA and the domains of competence and competencies follows.

The most relevant domains of competence for each EPA are listed and depicted by large icons. The secondary domains are also listed and defined by smaller icons. Less relevant domains for a particular EPA are shown in gray.

Specific elements within the EPA are then listed along with the specific competencies that map to each element. This mapping is useful for developing assessment rubrics.

CBVE: Entrustable Professional Activities (EPAs)

1	Gathers a history, performs an examination, and creates a prioritized differential diagnosis list
2	Develops a diagnostic plan and interprets results
3	Develops and implements a management/treatment plan
4	Recognizes a patient requiring urgent or emergent care and initiates evaluation and management
5	Formulates relevant questions and retrieves evidence to advance care
6	Performs a common surgical procedure on a stable patient, including pre-operative and post-operative management
7	Performs general anesthesia and recovery of a stable patient including monitoring and support
8	Formulates recommendations for preventive healthcare

EPA 1

Gathers a history, performs an examination, and creates a prioritized differential diagnosis list

DESCRIPTION OF ACTIVITY	Obtains a history and performs an exam on an individual animal or herd/flock and assimilates the information collected to derive a prioritized differential diagnosis.
COMMENTARY	The history and examination should be tailored to the clinical situation and specific patient encounter. This data gathering serves as the foundation for evaluation and management. Expectations include integration of the scientific foundations of medicine with clinical reasoning skills to guide information gathering. Dividing this EPA into three nested EPAs (history taking, examination and differential diagnosis generation) may facilitate use in the learning environment.
MOST RELEVANT DOMAINS	**1: Clinical Reasoning & Decision-making** ■ **5: Communication** ■
SECONDARY DOMAINS	2: Individual Animal Care & Management ■ 6: Collaboration ■ 8: Financial & Practice Management ■
ELEMENTS WITHIN ACTIVITY	**Consultation** • Obtains a complete and accurate history in an organized fashion **[1.1]** ■ • Demonstrates client-centered interview skills (establishes rapport, attentive to verbal and nonverbal cues, client culture, socioeconomic factors, demonstrates active listening skills) **[5.1, 5.2]** ■ • Identifies the client complaint **[1.1]** ■ • Identifies pertinent history elements associated with common conditions **[1.1]** ■ • Demonstrates cultural competence in interactions with clients, recognizing the potential for bias **[5.2, 6.4]** ■ ■ **Examination** • Performs exam (individual animal or group) **[1.1]** ■ • Communicates findings **[5.1]** ■ • Attends to patient welfare and safety of client, staff and self **[1.4, 2.2, 8.3]** ■ ■ ■ • Documents findings in the medical record **[5.3]** ■ **Determining Differential Diagnosis** • Creates a problem list and differential diagnosis list **[1.2]** ■ • Justifies prioritized differential diagnosis(es) **[1.2]** ■ • Consults or refers as needed **[1.7]** ■ • Documents findings in the medical record **[5.3]** ■

EPA 2

Develops a diagnostic plan and interprets results

DESCRIPTION OF ACTIVITY	Integrates individual animal or group data to create a prioritized differential diagnosis list and determines a diagnostic plan, obtains consent for diagnostic testing and interprets results.
COMMENTARY	Developing a diagnostic action plan is an iterative, reflective process that requires continuous adaptation to avoid common errors of clinical reasoning.
MOST RELEVANT DOMAINS	**1: Clinical Reasoning & Decision-making** ■ **5: Communication** ■
SECONDARY DOMAINS	2: Individual Animal Care & Management ■ 6: Collaboration ■ 9: Scholarship ■
ELEMENTS WITHIN ACTIVITY	• Uses clinical reasoning skills to create a prioritized differential diagnosis list **[1.2, 9.1]** ■ ■ • Selects initial diagnostic tests/procedures even in the face of ambiguity **[1.3, 1.4, 9.1]** ■ ■ • Identifies when referral is indicated and consults or refers as needed **[1.7]** ■ • Performs diagnostic procedures **[2.1]** ■ • Explains working diagnosis and rationale for further testing **[1.3, 5.1]** ■ ■ • Develops a financial estimate and obtains and documents informed consent **[1.4, 5.2, 5.3, 8.1]** ■ ■ ■ • Interprets test results **[1.1]** ■ • Updates working diagnosis, diagnostic plan and client communication as new information is obtained **[1.3, 5.2, 9.1]** ■ ■ ■ • Documents diagnostic plan in medical record **[5.3]** ■

EPA 3

Develops and implements a management/treatment plan

DESCRIPTION OF ACTIVITY	Utilizes working diagnosis and client considerations to formulate a management/treatment plan for an individual animal or group (including referral or euthanasia when warranted), implements the plan and adjusts based on response.
COMMENTARY	Developing a management/treatment plan is an iterative, reflective process that requires consideration of the patient, client, veterinary team and resources as well as ethical and legal factors. Implementation of the plan includes performance of veterinary procedures, team collaboration and client education.
MOST RELEVANT DOMAINS	**1: Clinical Reasoning & Decision-making** **2: Individual Animal Care & Management** **5: Communication** **7: Professionalism & Professional Identity** **8: Practice & Financial Management**
SECONDARY DOMAINS	3: Animal Population Care & Management 6: Collaboration 9: Scholarship
ELEMENTS WITHIN ACTIVITY	• Uses clinical reasoning skills to integrate medical, ethical, legal and financial factors, and client goals, to create a management/treatment plan **[1.3, 1.4, 3.1, 7.1, 8.2, 9.1]** • Acts in the face of ambiguity resulting from gaps in available information **[1.3, 1.6, 7.3]** • Explains treatment options to client and respond to questions **[1.4, 5.1, 5.2]** • Performs therapeutic interventions, including euthanasia when warranted **[2.1]** • Educates client or team to provide ongoing care for patient, and recognizes changes or concerns that trigger additional action **[1.3, 5.1, 6.3, 9.2]** • Integrates new information as it is available to update management/treatment plan **[1.3, 9.1]** • Recognizes limitations and arranges for referral as needed **[1.7, 6.1]** • Documents therapeutic plan in medical record **[5.3]** • Communicates with clients or team to determine patient status, compliance with recommendations, and/or capability to implement treatment plan. **[5.2, 6.3]** • Obtains informed consent and documents in medical record **[5.2, 5.3]**

EPA 4

Recognizes a patient requiring urgent or emergent care and initiates evaluation and management

DESCRIPTION OF ACTIVITY	Recognizes a patient/situation that requires urgent or emergent care and triage based on severity. Initial emergency management should include procedures that support vital functions.
COMMENTARY	This activity requires application of knowledge and psychomotor skills as well as the ability to function as part of a team, to recognize own limitations, and to seek help when necessary. Initial evaluation of patient(s) should include level of consciousness and adequacy of ventilation and circulation.
MOST RELEVANT DOMAINS	**1: Clinical Reasoning & Decision-making** ■ **2: Individual Animal Care & Management** ■ **6: Collaboration** ■ **7: Professionalism & Professional Identity** ■
SECONDARY DOMAINS	5: Communication ■
ELEMENTS WITHIN ACTIVITY	• Quickly assesses a situation to identify patient(s) that might require urgent or emergent treatment **[1.1, 1.5]** ■ • In the case of multiple patients, effectively triages patient care according to severity of condition **[1.5]** ■ • Evaluates patient status to determine and triage urgent problems **[1.1, 1.5, 7.2]** ■ ■ • Updates client on the urgency of the patient's status, immediate management plans and obtains and documents informed consent **[5.1, 5.2, 5.3]** ■ • As necessary, initiates emergency management to support vital functions **[2.1]** ■ • Identifies potential underlying etiologies for the urgent or emergent patient and determines initial management plan **[1.2, 1.3]** ■ • Discusses patient status and initial management plan (including euthanasia when warranted) with client and identifies client goals **[1.3, 1.4, 5.1, 5.2, 7.1]** ■ ■ ■ • Optimizes patient care by engaging team members, determining when to function as a leader or team member and working within own limitations **[1.7, 6.1, 6.2]** ■ ■ • Documents initial patient assessment, interventions, possible diagnoses and management plan, and client communication in the medical record **[5.3]** ■

EPA 5

Formulates relevant questions and retrieves evidence to advance care

DESCRIPTION OF ACTIVITY	Identifies questions and information resources. Critiques the quality of the evidence and assesses the applicability to the clinical situation.
COMMENTARY	The use of evidence-based practices and self-awareness are essential to identify and remedy/correct knowledge gaps. Life-long learning is an essential professional practice to promote quality patient and population care.
MOST RELEVANT DOMAINS	**1: Clinical Reasoning & Decision-making** ■ **7: Professionalism & Professional Identity** ■ **9: Scholarship** ■
ELEMENTS WITHIN ACTIVITY	• Formulates focused pertinent questions and identifies gaps in knowledge **[7.4, 9.1]** ■ ■ • Assesses applicability and generalizability of published studies to specific clinical situations **[1.6, 9.1]** ■ ■ • Identifies, retrieves and appraises resources, including new information **[7.4, 9.1]** ■ ■ • Consults when appropriate **[1.7, 7.4]** ■ ■ • Evaluates animal/group response to interventions and uses available evidence to adjust care plan **[1.3]** ■

EPA 6

Performs a common surgical procedure on a stable patient, including pre-operative and post-operative management

DESCRIPTION OF ACTIVITY	Performs a surgical procedure, including pre-operative preparation of the patient and surgeon and post-operative care.
COMMENTARY	This activity requires attention to patient and surgeon preparation to minimize contamination, knowledge of the procedure and regional anatomy, manual dexterity to competently and efficiently complete the procedure, reflection and response to changes, and formulation of post-operative care plan.
MOST RELEVANT DOMAINS	**1: Clinical Reasoning & Decision-making** ■ **2: Individual Animal Care & Management** ■ **5: Communication** ■ **6: Collaboration** ■
ELEMENTS WITHIN ACTIVITY	• Formulates surgical plan incorporating pre-operative considerations **[2.1]** ■ • Obtains and documents informed consent **[5.1, 5.3]** ■ • Directs the veterinary team to assist in procedure **[6.2]** ■ • Aseptically prepares self and surgical site **[2.1]** ■ • Performs surgical procedure **[2.1]** ■ • Applies principles of asepsis and surgery **[2.1]** ■ • Recognizes own limitations and asks for assistance when required **[1.7]** ■ • Responds to changes in patient status **[1.3, 1.5]** ■ • Formulates analgesic and post-operative care plan **[1.3, 2.1]** ■ ■ • Communicates surgical findings and post-operative care to client **[5.1, 6.3]** ■ ■ • Documents surgical procedure, post-operative care plan, and client communication in the medical record [5.3] n

EPA 7

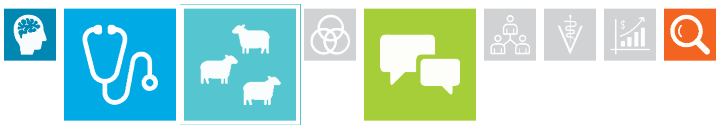
Performs general anesthesia and recovery of a stable patient including monitoring and support

DESCRIPTION OF ACTIVITY	Induces, maintains and recovers a stable anesthetic patient (ASA 1 or 2), including monitoring vital functions and providing supportive care. Evaluates patient status and determines a suitable anesthetic and analgesic protocol.
COMMENTARY	Applies knowledge of anatomy, physiology, pharmacology and the procedure as well as psychomotor skills to execute the protocol safely. Recognizes and manages complications.
MOST RELEVANT DOMAINS	**1: Clinical Reasoning & Decision-making** ■ **2: Individual Animal Care & Management** ■ **5: Communication** ■ **6: Collaboration** ■ **8: Practice & Financial Management** ■
ELEMENTS WITHIN ACTIVITY	• Evaluates patient based on history, physical examination, results of diagnostic tests and procedure for suitability for anesthesia (ASA status 1 or 2) **[1.1, 1.3]** ■ • Formulates a general anesthetic and analgesic protocol including premedication, induction, maintenance and recovery. Selects drugs and equipment **[1.3]** ■ • Shares plan with team members and answers questions **[6.1]** ■ • Executes anesthesia and recovery safely **[2.1].** ■ • Collaborates with others to update plan as needed **[6.1]** ■ • Complies with legal requirements for use of controlled substances **[8.2]** ■ • Maintains records including drugs, vital signs, important anesthetic and procedural events and complications **[5.3]** ■

EPA 8

Formulates recommendations for preventive healthcare

DESCRIPTION OF ACTIVITY	Creates a preventive healthcare plan, considering the animal/group needs and the care setting, to optimize health and welfare, and to prevent spread of disease.
COMMENTARY	Prevention of disease is a core veterinary activity that protects the health of animals and the public.
MOST RELEVANT DOMAINS	**2: Individual Animal Care & Management** ■ **3: Animal Population Care & Management** ■ **5: Communication** ■
SECONDARY DOMAINS	1: Clinical Reasoning & Decision-making ■ 9: Scholarship ■
ELEMENTS WITHIN ACTIVITY	• Evaluates animal/ group needs, considering age, health status, exposure risk **[1.1, 2.2, 3.1]** ■ ■ ■ • Makes recommendations regarding disease screening **[1.1, 2.2, 3.1, 5.1]** ■ ■ ■ ■ • Educates clients and stakeholders on disease prevention measures **[2.2, 3.1, 3.3, 5.1, 5.2, 9.2]** ■ ■ ■ ■ • Performs preventive healthcare measures **[2.1]** ■ • Documents recommendations and procedures in the medical record **[5.3]** ■



Notes

AAVMC
CBVE
Competency-Based
Veterinary Education

Competency-Based Veterinary Education:

Toolkit

CBVE: Toolkit — Introduction

Competency-based Veterinary Education (CBVE) focuses on learner-centered education with outcomes-based assessments. One of the most commonly asked questions about CBVE is: What evaluative or assessment tools should be used in various circumstances?

In the full version of the CBVE Toolkit (see: **https://cbve.org/assessment-toolkit**), collated informative summaries and references for 21 evaluative tools are provided. Each tool is described with pertinent domains and competencies listed. Examples, documented uses, evidence for efficacy (pros and cons where available), and selected references are provided for each tool. When available, links to examples in use are provided.

For this publication, the abbreviated CBVE Toolkit includes only descriptions and pros/cons of each assessment tool.

Notes

CBVE: Toolkit — Summary Table

	COMPETENCIES ASSESSED		
	Clinical Knowledge "What You Know"	Critical Reasoning "How You Think"	
	Individual Animal Care, Animal Population Care, & Public Health	Clinical Reasoning & Decision-Making	Gathering & Evaluating Information
Domains of Competence	2, 3, 4	1	1, 2, 5
Entrustable Professional Activities (EPAs)	2, 3, 4, 6, 7, 8	2, 3, 4, 6, 7	2, 3
ASSESSMENT TYPE			
Written & Oral Examinations			
Multiple Choice Questions (MCQ)	X	X	
Extended Matching Questions (EMQ)	X	X	
Fill in the Blank (FITB)	X	X	
Short Answer Questions (SAQ)	X	X	
Essay Questions	X	X	
Script Concordance Testing (SCT)		X	
Oral Examinations	X	X	
Chart Stimulated Recall Examination (CSR)	X	X	
Key Features Examination		X	
Practical (Skills) Examinations			
In-Training Evaluation Report (ITER)	X	X	X
Case-Based Discussion	X	X	
Direct Observation of Procedural Skills (DOPS)			
Objective Structured Clinical Examination (OSCE)			
Clinical Evaluation Exercise (CEX)			
Mini-Clinical Evaluation Exercise (Mini-CEX)			
Longitudinal Evaluation of Performance (LEP)	X	X	X
360° Evaluations (Multi-Source Feedback)			
Portfolios	X	X	X
Entrustment-supervision scales	X	X	X
Student Assignments			
Capstone Assignments			X
Case Logs	X	X	X

This table reconciles the CBVE Toolkit assessments with domains and entrustable professional activities (EPAs). The reader can search for any of the nine domains of competence and the eight EPAs, and in that same column can then identify different assessment tools that are suggested to address those domains and EPAs. The individual tools suggested for assessment of each competency are described in greater detail in the CBVE Toolkit.

	Technical Skills "What You Can Do"	Professional Identity "How You Interact"		
	Medical, Surgical, & Anesthetic Procedures	Written Communication	Verbal Communication	Collegiality & Teamwork
	1, 2, 6, 7	5, 8, 9	5, 8, 9	6
	3, 6, 7	1, 3, 4, 5, 8	1, 3, 4, 5, 8	4, 7
		X		
		X		
		X		
		X	X	
			X	
			X	
		X	X	
	X	X	X	X
			X	
	X			
	X		X	
	X			
	X			
	X	X	X	
				X
		X		
	X	X	X	X
		X		
		X		

CBVE: Toolkit — Assessment Tools

WRITTEN & ORAL EXAMINATIONS:

Multiple Choice Questions

DESCRIPTION:
Multiple choice questions (MCQs) are commonly written as one-best-answer items. One-best-answer MCQs have a stem that is followed by a series of response options. The response options include one correct answer and a series of "distractors" that are incorrect. True-false items are another MCQ type. True-false MCQs have a lead-in question and a series of response options where the number of "true" responses varies from one to all of the set of responses.

PROS & CONS:

Positive Aspects/Pros:
- Well-written MCQs can produce high item discrimination and reliability, and so are commonly used for high-stakes licensing veterinary and medical licensing exams.
- MCQs can be used to broadly sample curricular content in assessment blueprinting.
- Depending on how they are targeted and written, MCQs can assess several levels of Bloom's hierarchy of learning objectives in the cognitive domain. This enables assessment of a variety of foundational and clinical knowledge and problem-solving skills using fact-oriented or scenario-oriented assessment.
- Test-takers are generally familiar with the MCQ format.
- MCQs can be efficiently graded using computer-based testing and student performance statistics readily evaluated.

Negative Aspects/Cons:
- MCQs are not well suited to evaluating performance of procedural skills or performance in the workplace.
- Other forms of assessment are more effective for evaluating the psychomotor or attitudinal domains of Bloom's taxonomy.
- Training and time are required to write high quality MCQs without flaws.

Extended Matching Questions

DESCRIPTION:
Extended matching questions (EMQs) are a type of selected-response (multiple choice) question. They are similar in format to simple one-best-answer multiple choice questions but differ in that they involve large potential option sets, with multiple question stems per item. There are two varieties of extended matching questions, including one-best-answer and pick-N-options (in which there are more than one correct answer) formats.

PROS & CONS:
As of 2021, no systematic reviews or meta-analyses of EMQs were found in the literature. However, available studies (Bhakta et al., 2005; Buellens et al., 2005; Swanson et al., 2008) and the prevalent use of EMQs in high-stakes professionally designed examinations suggest that EMQs demonstrate good psychometric properties and are considered valuable items in valid assessments of abilities such as clinical reasoning.

Positive Aspects/Pros:
- EMQs provide superior item discrimination when compared to one-best-answer selected-response questions.
- Like well-written one-best-answer selected-response questions, EMQs can produce high item discrimination and reliability when compared to many other item formats.
- EMQs are well suited to measuring conceptual knowledge, principles, and problem solving (e.g. diagnostic and clinical reasoning).

Negative Aspects/Cons:
- EMQs are not well suited to evaluation in workplace-based settings, measurement of psychomotor skills, memorization of verbal information, or evaluation of procedures.
- Training is required to write effective questions.
- Learners who are not familiar with the format may find it confusing.

CBVE: Toolkit — Assessment Tools

Fill in the Blank Questions

DESCRIPTION:
Fill in the blank (FITB) questions are a type of assessment best used when testing for one or several explicitly correct responses. Fill in the blank questions are best designed using clear, explicit instructions to specify the answer format and acceptable variation. They should be clearly worded using correct and neutral grammar to avoid extraneous clues and so that students understand the nature of information being requested. They should be phrased so that the answer is brief and specific. The blank to be completed should be at or near the end of the question. When a numeric response is required, it should specify the degree of precision expected or units of measurement. For best practices in scoring, the question should be phrased so that there is only one answer, or a limited range of possible answers and use pre-established scoring rubrics.

PROS & CONS:

Positive Aspects/Pros:
- Assesses cognitive domain for assessing who, what, where, and when information
- Limited to knowledge and comprehension questions
- Reduced rote memorization by not using direct quotes in the stem of the question
- Easy to administer
- Possible to identify questions on the entire curriculum
- Requires students to fill in the important term or phrase
- Promotes more in-depth study to recall answers
- Quicker for students to complete than multiple choice (consider having to read through all options prior to making an informed response)
- More comprehensive and reliable than essay questions
- Provides diagnostic information when looking at types of errors
- Improved reliability if there are structured marking schemes, clear outline answers, and independent double scoring used
- Less likely for scores to be influenced by guessing

Negative Aspects/Cons:
- Encourages rote memorization
- Unable to assess skills and attitude
- Inability to measure linguistic skill and power of expression
- Inability to measure higher mental faculties (e.g., logic)
- Inability to measure insight and foresight
- Handwriting and spelling skills may influence assessment.
- Difficult to write items that have only one clear answer
- Not suitable for item analysis
- Subjective scoring takes more time and is more difficult.

Short Answer Questions

DESCRIPTION:
Although some conflate short answer questions with fill in the blank (FITB) questions, the education literature is fairly clear that these are separate question types that assess different levels of thinking and learning. Short answer questions are open-ended questions requiring students to respond with a brief written answer, generally a paragraph or less but often restricted to one to three sentences. Because they require students to recall information rather than select from a list of potential responses, short answer questions are better for testing higher order thinking skills and separating out those students who have achieved deep learning from those who have obtained only surface level learning. In general, students should earn more credit for these types of questions as they are more demanding than those requiring recognition of answers (MCQs, FITB, T/F).

PROS & CONS:

Positive Aspects/Pros:
- Relies on recall vs recognition
- Differentiates deep vs surface learning of students
- Easier to write well than MCQs, FITB
- Good for testing higher order thinking skills

Negative Aspects/Cons:
- Less efficient than MCQ, FITB exams
- Cannot cover as much breadth of material due to length
- Poor validity and reliability unless multiple graders
- Can be demotivating to students

CBVE: Toolkit — Assessment Tools

Essay Questions

DESCRIPTION:
Essay questions allow for different or original responses or patterns of responses and elicits responses that must consist of more than one sentence. Essay questions also provide learners with an indication of the types of thinking and content to use in responding to the essay question and require learners to compose rather than select a response option. These types of questions require subjective judgment by a competent specialist to assess the accuracy and quality of responses and where double marking might be recommended to improve reliability.

PROS & CONS:

Positive Aspects/Pros:
- Can assess higher-order or critical thinking skills
- Can evaluate student thinking and reasoning
- Provides authentic experience closer to real practice
- Written feedback possible (+) but also time consuming (-)
- May provide practice to improve poor or unpolished writing

NEGATIVE ASPECTS/CONS:
- Assesses a limited sample of the range of content
- Difficult and time consuming to grade
- Reliability often low as sampling across content tends to be low, unless a large number of essays are used
- Labor intensive scoring
- The word "essay" can be confusing to students in their interpretation of the format.
- Not recommended for high-stakes assessment
- Techniques to detect plagiarism should be considered.

Script Concordance (SCT)

DESCRIPTION:
The SCT is a written test designed to evaluate examinees' ability to interpret clinical information in ill-defined situations and then compares their judgment to experts. The test is based on illness script theory. Examinees are presented with a brief case vignette, followed by an initial hypothesis. The second step presents new information that may affect the likelihood of the hypothesis. In the third step, examinees are asked to indicate the effect of the new information on the original hypothesis. There is no single correct answer. Instead, scores are determined based on the proportion of experienced clinicians selecting a particular answer (Lubarsky et al., 2013; Ramaekers, 2010).

PROS & CONS:

Positive aspects/pros:
- Studied in many health professions
- Assesses a specific domain of clinical reasoning – ability to interpret medical information under ill-defined conditions
- Good construct validity
- Compares examinees to clinicians
- Written test – easy to administer, 60-90 minutes
- Requires students to apply their knowledge

Negative aspects/cons:
- Items difficult to construct
- Minimum of 25 cases with 3 items each for optimal reliability
- Requires a panel of experts (10-15) to review/score proposed questions
- Not useful for evaluating content-area knowledge
- Considerable concerns about test validity:
  - Process validity (concerns about whether examinees share the same view of constructs under examination as experts)
  - Aggregate scoring of SCT may not be valid.
  - Potential bias against examinees who select extreme options.

CBVE: Toolkit — Assessment Tools

Oral Examination

DESCRIPTION:
The oral examination, also referred to as viva voce, is the oldest form of examination (Stray, 2001). It is comprised of the examiner(s) verbally asking questions to which the examinee provides a verbal reply. Oral examinations may be either unstructured or structured. Structured oral examinations utilize a standard scenario, questions, and scoring methodology, whereas unstructured ones do not. Unstructured oral examinations in medical training were standard for many years but were discontinued by the National Board of Medical Examiners in 1963 when data demonstrated poor correlation (0.25) between examiners (Hodges, 2006).

When compared to unstructured oral examinations, structured oral examinations demonstrate improved reliability and inter-rater reliability (Anastakis et al., 1991; Jefferies et al., 2011). Structured oral examinations also had greater correlation to multiple-choice questions and objective structured clinical examinations when compared to unstructured oral examinations (Anastakis et al., 1991. Reliability is further increased by using more than one oral examination per examinee, use of several examiners when multiple oral examinations are given, standardization of questions, scoring with a rubric, and training the examiners (Daelmans et al., 2001; Davis and Karunathilake, 2005; Touchie et al., 2010; Wakeford et al., 1995).

Oral examinations can be constructed to evaluate critical thinking, reasoning skills, and higher order cognitive skills. However, studies evaluating oral examinations found that they frequently test at a lower cognitive level (i.e., knowledge/recall of information) rather than at the higher levels of understand, apply, analyze, synthesize, and evaluate (Davis and Karunathilake, 2005).

Unstructured oral examinations can be utilized as a formative assessment.

Structured oral examinations can be utilized either as formative or summative assessments.

PROS & CONS:

Positive Aspects/Pros:
- Evidence for efficacy
- Elucidate knowledge, critical thinking, and reasoning skills, and may allow evaluator to form subjective impressions of other characteristics (attitudes, values, beliefs)
- Allows for immediate feedback

Negative Aspects/Cons:
- Poor reliability and validity with unstructured or poorly structured oral exams
- Time consuming – can be further compounded if multiple examiners and multiple exams are utilized
- Can be intimidating for students
- Risk of evaluator bias (sex, race, age, language proficiency)

Chart-Stimulated Recall

DESCRIPTION:
Chart-stimulated recall (CSR) is similar to case-based discussion. It is a hybrid format with elements of oral examination and case-based discussion. Both the evaluator and the examinee are provided with the chart of a patient previously examined/treated by the examinee. The specific case can either be selected by the examinee (self-selected) or may be chosen by the examiner. Both parties independently review the medical record prior to meeting. This process gives the examinee a chance to re-familiarize themselves with the case. The examiner may or may not have any previous association with the case. The examinee is then interviewed regarding case specifics with the goal of determining the process and reasonings for clinical decision making, which are often not included in the chart audit. This tool can be used either as a summative or formative method of assessment. If the goal is to utilize this assessment in a summative manner, training of evaluators and guidance with case selection are strongly recommended.

PROS & CONS:

Positive Aspects/Pros:
- Evidence for efficacy (Norman et al., 1993; Cunnington et al., 1997)
- Helps elucidate critical thinking and reasoning skills
- Provides opportunity for quality feedback and mentorship
- Encourages reflective practice

CBVE: Toolkit — Assessment Tools

- High perceived value (Holt and Sofair, 2017)
- Can be used for both formative and summative assessment

Negative Aspects/Cons:

- Time consuming
- Can be intimidating to student
- Risk of evaluator bias (sex, race, age, language proficiency)
- Poorer recall for evaluation of cases further in the past
- Varying degree of case difficulty
- Use in summative assessment recommends training of evaluators with guidance in case selection

Key Features Examination

DESCRIPTION:

Assessments including key feature items help evaluate clinical decision-making. A key feature is defined as a critical step in the resolution of a problem, where two corollaries are important to include in the general definition of a key feature: "1) it focuses on a step in which examinees are most likely to make errors in the resolution of a problem, and 2) it is a difficult aspect of the identification and management of the problem in practice" (Page et al., 1995).

A number of formats for these items are described in the literature, but most common are the short menu (a variation of "Pick N") and write-in formats (Nayer et al., 2018). One key feature case will commonly contain a problem scenario, with an average of 2-3 questions, and allows sequential pieces of clinical information to be provided between questions (Farmer and Page, 2005). By focusing on the most challenging decisions and actions in each case, examinations using key feature items may contain many short, focused cases and increase the number of cases per testing time, resulting in better content representation for the domain assessed. Furthermore, key feature items can provide improved item discrimination by focusing on the most important diagnostic features of a problem and reducing the impact of other kinds of knowledge on test scores.

PROS & CONS:

Positive Aspects/Pros:

- Key feature questions assess clinical decision making. They do not assess knowledge retention and instead assess decision-making based on synthesis and evaluation of information in Bloom's cognitive taxonomy.
- By focusing on the critical steps required for successful resolution of a clinical problem, a key feature case can reliably and validly assess decision-making skills in a particular area using as few as 2-3 items per case vignette (Norman et al., 2006).
- Oral and written examinations tend to overly reward thoroughness (i.e., the more good things an examinee does, the higher the score). However, it has been shown that thoroughness is a poor predictor of performance (Elstein, 1978) and is indicative of novice behavior.
- Scoring that rewards only key decisions contributes to more reliable and valid test scores (Bordage and Page, 2018b).

Negative Aspects/Cons:

- Key feature questions do not assess clinical reasoning; they measure the outcome of the clinical reasoning process and not the process itself.
- As key feature items also do not assess knowledge retention, they must be used with caution in preclinical courses, by making sure that students have the requisite support and clinical background to handle the question type.
- Key feature questions are not designed or well suited to evaluating performance of procedural skills or for assessment in the psychomotor or attitudinal domains of Bloom's taxonomy.
- Training and time are required to write high quality and valid key features items.

CBVE: Toolkit — Assessment Tools

PRACTICAL (SKILLS) EXAMINATIONS

In-Training Evaluation Report (ITER)

DESCRIPTION:
Historically, ITERs are the most commonly used evaluation form in the veterinary medicine clinical training environment (and the one with the least published about it). They are often used in a summative manner to provide a learner with feedback during or following a learning experience (typically a clinical rotation). Scoring in an ITER usually includes rating on a Likert or numerical scale and qualitative comments. ITERs are often heavily focused on professionalism, work ethic, knowledge, and communication. Written comments may be most helpful in identifying struggling learners but are often criticized for being vague and hard to interpret. ITERs are also referred to in the literature as clinical performance reports, performance assessment forms, clinical performance progress reports, or end-of-clinical rotation reports.

PROS & CONS:

Positive aspects/pros:
- Used broadly across the health professions training settings
- Recent research from medicine has focused on completing ITERs more effectively, especially the qualitative comments.
- Can assess the quality of the ITER using the Completed Clinical Evaluation Report Rating (CCERR)

Negative aspects/cons:
- Evidence suggests that the final assessment (i.e., pass versus fail) marked on the ITER is not always consistent with the evaluator's judgment of a trainee's performance, especially for poorly performing residents.
- May be difficult to recall events that occurred earlier in the training period, resulting in criticism of this method as focusing on the more recent events only
- Some negative perception from faculty related to the amount of time needed to complete these forms

Case-Based Discussion

DESCRIPTION:
This evaluation is a formal discussion between a student and clinician/professor about a case for which a student has had direct responsibility. The discussion includes all case records. The instructor asks questions to determine the student's depth of understanding, decision-making and clinical judgment. The instructor should be determining the quality of all aspects of the student's case management skills (e.g., record-keeping, client communications). The student is offered the chance to explain their decision-making throughout the discussion. A consistent rubric should be used and discussed with the student, followed by a short feedback session to help the student improve on the next case. This tool is used primarily for formative assessment (versus summative).

PROS & CONS:

Positive Aspects/Pros:
- Evidence for efficacy
- Lower stakes for student
- Helps elucidate critical thinking and reasoning skills
- Provides opportunity for quality feedback and mentorship

Negative Aspects/Cons:
- Time consuming
- Can be intimidating to student
- Not valid/reliable for summative assessments

CBVE: Toolkit — Assessment Tools

Direct Observation of Procedural Skills (DOPS)

DESCRIPTION:
This evaluation format is specifically designed to assess practical skills in a workplace setting. A trainee is observed and scored by an assessor while performing a routine practical procedure during normal clinical work. A standardized DOPS form is used to score the technique. Based on studies in medical education, for any specific skill the trainee must pass a number of repeated assessments; typically six, though more recent studies suggest fewer (three) may be needed to be signed off as competent at that skill with a reasonable level of reliability.

PROS & CONS:

Positive Aspects/Pros:
- High authenticity
- Evidence for validity and reliability in specific settings e.g., gastroscopy in medical education (Siau et al., 2020)
- Multiple assessments of the same skill can be evaluated using standardized form.
- Valuable opportunity for formative feedback

Negative Aspects/Cons:
- Time consuming to administer
- Requires the availability of a dedicated observer for an entire clinical encounter
- Multiple observations over time are needed for reliability.

Objective Structured Clinical Examination (OSCE)

DESCRIPTION:
OSCEs have been used in medical education over the past four decades and are now widely accepted in health professions education to assess hands-on technical skills or communication skills. They consist of a timed circuit of multiple mini stations with different skills or tasks being assessed in each station. OSCEs use a standardized form for grading – a binary checklist or global rating scale (GRS). Assessments are at the level of "Shows" on Miller's Pyramid of Clinical Competence. The pass mark or minimum performance level (MPL) is set in advance using standard setting techniques such as modified Angoff, Ebel, or borderline regression.

PROS & CONS:

Positive Aspects/Pros:
- Considered gold standard for assessment of technical and communication skills across the health professions training settings outside of the clinical workplace
- Widely used in veterinary medicine for clinical skills and communication skills training – goes by many names such as OSPEs (objective structured practical exams), OSPVEs (objective structured practical veterinary exams)
- Near-peer assessment has been used.
- Generalizability theory can help determine where the source of variation between student performance comes from. Ideally the only source of variation would be from the students' ability, but often there are many factors to consider – different animals, different raters, different sites, or different days, for instance. The more variables that can be controlled for, the better.
- Piloting stations before the OSCE can improve reliability.
- Assessors should be trained in advance and repeat rater volunteers should have their training refreshed on a regular interval. Consistency amongst raters is important regarding what elements of student performance are critical and this should be based upon how the skill was taught in the skills center.

Negative Aspects/Cons:
- Can be anxiety-inducing for novice learners
- Poorly designed OSCEs can have low reliability so quality assurance and review of evaluation of reliability are essential as part of the examination process. Cronbach's alpha is a commonly used method of internal consistency (reliability assessment).

Clinical Evaluation Exercise (CEX)

DESCRIPTION:
The CEX is used to evaluate a student's (or resident's) clinical skills in a workplace setting. In the predecessor "long case evaluation," students took a history and performed a physical examination, and then reported their findings to one or more supervising evaluators who questioned the student about the case in order to perform an evaluation (Norcini, 2001). The evaluation was therefore indirect in that the student self-reported to the examiner(s) and the examiner(s) did not directly observe the student interacting with the patient. Ultimately, long case evaluation inter-examiner reliability proved poor (Wilson et al., 1969). The CEX was developed as a tool where

the examiner directly observes the student's history taking and physical examination, completes a standardized evaluation, and provides immediate feedback to the student.

PROS & CONS:

Positive Aspects/Pros:

- Evidence for efficacy: Veterinary educational efficacy remains unproven but this observational technique is used often in veterinary teaching hospitals. The potentially cumbersome length and impracticality have led to the development of the mini-CEX to improve efficiency.
- Evaluations can be quick: 15-20 minutes for a specific technique or procedure, but that focused evaluation could be considered a mini-CEX instead of a typically lengthier CEX.
- Feedback is immediate for the student.
- Scoring of the CEX is more standardized than the previous long case evaluation, so the CEX should be more consistent between students and between evaluators.
- Inter-rater scoring can be made more reliable with more than one rater simultaneously observing the same patient interaction, and with standardization of evaluation rubrics.

Negative Aspects/Cons:

- Reliability of the CEX has been criticized (Durning et al., 2002). Different evaluators may score the same student differently.
- The original CEX was developed to be 2 hours in duration as part of a standardized certification examination, making it impractical in most clinical business settings (Searle 2008).

Mini-Clinical Evaluation Exercise (mini-CEX)

DESCRIPTION:

The mini-CEX is a method used to evaluate learners engaged in an authentic clinical encounter in a workplace-based setting. It is patterned after the original, longer, CEX. Originally designed to measure "a focused history and physical examination" in the training of medical residents (Norcini et al. 1995 p. 795)", this modality is now employed to assess history taking, physical examination skills, communication skills, clinical judgment, professionalism, organization/ efficiency, and overall clinical care (Norcini and Burch, 2007), and is employed in a variety of health professions including nursing, midwifery, dentistry, and veterinary medicine (Lorwad et al. 2017). In a typical mini-CEX encounter, the evaluator observes the examinee for approximately 20 minutes conducting a task or series of tasks in an authentic clinical setting. The evaluator then provides oral feedback, as well as a completed evaluation form. Students are likely to be evaluated using multiple mini-CEX encounters over time in order to increase reliability and document change/ improvement.

PROS & CONS:

Positive Aspects/Pros:

- Evidence for efficacy: The mini-CEX has been studied in a variety of workplace-based settings, and there is evidence for its effectiveness and feasibility across a variety of disciplines in medical sciences education (see cited literature, below). The mini-CEX has been studied less in veterinary medical education contexts than in other medical education settings, but available research suggests that it performs similarly in veterinary education settings to other medical education settings. Weijs, Coe, and Hecker (2015) found that students and instructors found mini-CEX to be beneficial for learning and assessment, and Bok and colleagues (2018) found mini-CEXs to be a valuable component of their validated programmatic assessment approach.
- As a global observation tool, the mini-CEX is suitable for evaluating learners' overall ability in broad areas of performance such as "medical interviewing", "physical examination," and "professionalism." The mini-CEX is a familiar and proven tool in medical education, and multiple exemplars exist in the literature and in common use.

Negative Aspects/Cons:

- The mini-CEX does not specifically provide information at the level of subcompetencies, so inferences regarding proficiency at the level of subcompetencies must be provided through comments, or can be inferred from scores assigned at the broader competency level.
- Like other workplace-based assessment tools, the mini-CEX is time-consuming to administer, requiring the availability of a dedicated observer for an entire clinical encounter, and multiple observations over time.

CBVE: Toolkit — Assessment Tools

Longitudinal Evaluation of Performance (LEP)

DESCRIPTION:
The Longitudinal Evaluation of Performance (LEP) is a method that was adapted from mini-CEX where learners are observed in a clinic setting and the evaluator makes judgments regarding learner performance across several broad categories using standardized assessment forms. The primary difference with LEP is that serial observations are made over time to monitor learner progression towards achieving competence and the individual evaluations serve as formative feedback for the learners. The observations can be driven by the learner or the evaluator, with the former allowing learners to take greater responsibility for their own professional development. The use of multiple different evaluators to provide learners with feedback in LEP is considered advantageous to guard against bias and situations where there are professional relationship problems between the learner and evaluator.

PROS & CONS:

Positive Aspects/Pros:
- Evaluation forms can be flexibly adapted to assess a variety of different technical skills and professional skills.
- Allows monitoring of learner progression over time so that problems with performance can be identified earlier and remediation measures put in place to ensure learners have the opportunity to achieve competence
- Having feedback from multiple evaluators can provide a more holistic view of the student and guard against potential biases arising from problems in the professional relationship between a learner and evaluator.

Negative Aspects/Cons:
- Although each assessment form is generally quick to complete, it may generate a time burden for learners and evaluators if there are a large number of clinical events to assess.
- If students are not required to complete evaluation forms for all clinical events, they may tend to select events for evaluation that align with their strengths and avoid those with the potential to highlight their weaknesses.
- Requires a system for collating results from the evaluation form to monitor learner progress
- Requires a dedicated staff person and/or team to track the evaluations and develop remediation plans.

360° Evaluations (Multi-Source Feedback)

DESCRIPTION:
360° evaluations have traditionally been used to assess how individuals perform in the workplace environment by soliciting anonymous feedback on their behaviors and outcomes from people who are knowledgeable about their work. This group of evaluators includes raters who are hierarchically above, at the same level, and below the person being evaluated as this is thought to provide a more balanced assessment of performance than traditional top-down supervisor driven feedback. In a veterinary teaching hospital setting, potential raters could include line managers, mentors, clinicians, residents, interns, nurses, animal care assistants, receptionists, support staff, administrators, students, clients, and alumni. While 360° evaluations are often more traditionally used to evaluate faculty performance, there is potential for adapting them for use in student assessment.

Ratings from the 360° evaluations are also often compared against self-ratings to assess how well an individual can reflect on their own performance. The assessment surveys should be designed to take no longer than 5-10 minutes to complete given that raters may be asked to provide feedback on many other individuals in their work environment. Each 360° evaluation needs to include ratings from approximately 8-12 individuals in order to be effective.

CBVE: Toolkit — Assessment Tools

PROS & CONS:

Positive Aspects/Pros:
- Good for evaluating professionalism, communication, and interpersonal skills. Rubrics can easily be adapted to collect information on different attributes of performance
- Having feedback from multiple individuals with different professional relationships to the person being evaluated can provide a more holistic view of performance and is less prone to positive bias ("halo effect") and negative bias ("millstone effect").
- It can provide an anonymous means for individuals to provide feedback on their colleagues, particularly since many faculty have never been trained to give effective feedback and are uncomfortable discussing performance issues with students or residents.

Negative Aspects/Cons:
- It can be difficult to get faculty to make positive behavioral changes in response to feedback received through 360° evaluations (Lockyer et al., 2003).
- Collecting feedback can be time and resource intensive. There is often a need to purchase or subscribe to specialized software, which can be expensive for smaller programs.
- Some individuals experience strong negative emotional reactions to receiving negative feedback, particularly if they have higher self-ratings of their own performance (Sargeant et al., 2008; van der Meulen et al., 2021).

Portfolios

DESCRIPTION:
A portfolio is a cumulative body of work demonstrating a student's learning and achievements. Each individual piece or the entire body of work may be assessed as a demonstration of the cumulative learning for a course, semester, year, or program. The process of putting the portfolio together and receiving feedback on the individual pieces serves as a great formative assessment tool because it provides multiple opportunities for student-instructor interaction. Incorporation of checklists and/or specific tasks to be mastered are helpful to students and instructors, with suggestions for types of documentation to be included that would demonstrate attempts at and final mastery of skills also recommended. Content may be paper-based, electronic (e-portfolio), or a mixture, and may include materials selected by the student with or without guidance from the instructor. Materials should be diverse and might include written assignments, instructor feedback, case write-ups (including SOAP notes, documentation of client communications), links to videos of client/peer interactions, resumes/CVs, budgets, and the like.

PROS & CONS:

Positive Aspects/Pros:
- Thorough
- Longitudinal
- Requires a variety of skills and student reflection
- Actively promotes metacognition
- Can be formative and summative

Negative Aspects/Cons:
- Time-consuming
- Can be challenging to grade
- Requires excellent rubrics and/or multiple graders

EPAs and Entrustment-Supervision Scales

DESCRIPTION:
Historically, workplace-based assessments in health professions education have focused on evaluating learner proficiency, with scales typically employing anchors referencing specific behaviors (e.g. "Efficient time/motion but some unnecessary moves" on a surgery "Time and Motion" scale) or norm-based standards (e.g. "meets expectations" or "competent"). The CBVE Model incorporates an additional scale type, referred to by ten Cate et al. (2020) as 'Entrustment-Supervision (ES)' scales, which reference the extent to which the supervisor has confidence in the learner's ability to complete a task without assistance. Such scales are not stand-alone assessment tools but can be used with practical assessment tools such as mini-CEXs or ITERs. A number of ES scales exist. They most commonly allow the rater to indicate one of the following: 1. How much supervision was required for the learner to accomplish the task (e.g., what the supervisor had to do), 2. How independently the learner could accomplish the task, or 3. How much supervision the rater believes would be necessary the next time the student attempts the task.

CBVE: Toolkit — Assessment Tools

PROS & CONS:

Positive Aspects/Pros:

- EPAs are currently employed across health professions – nursing, dentistry, pharmacy, physiotherapy, and medicine.
- EPAs are observable in process and measurable in outcome.
- Assesses at the "does" or "is" level of Miller's pyramid of clinical competence (ten Cate et al., 2021)
- EPAs require application of knowledge, skills, and attitudes acquired in training which creates observable examples of competencies being performed.
- EPAs draw on multiple competencies but not necessarily equally. EPAs can be mapped against a competency framework to show how competencies are assessed.
- Can be used summatively or formatively. Summative decisions should be made on multiple sources of information.

Negative Aspects/Cons:

- Became very popular in a short time so perhaps there is less evidence to date for support than other assessment methods. Mostly descriptive publications to date.
- EPAs can sometimes be confused with competencies. Learners can possess competencies, knowledge, or skills (all abilities that the learner brings to the role) but a learner cannot possess an EPA (this is the professional work to be done).
- Entrustment, trust, and competence are also not readily distinguished (Melvin et al., 2020)
- Suitable for helping with assessment of workplace-based activities, but current EPAs do not include evaluation of all competencies in the CBVE framework.

STUDENT ASSIGNMENTS

Capstone Assignments

DESCRIPTION:

Capstone experiences, also called culminating experiences or transition experiences, are significant, summative, academic exercises positioned at milestone moments in curricula. The intent of a capstone from the student perspective can be to integrate, summarize, analyze, and critically reflect on what they have learned thus far in their training. From a curricular perspective, a capstone can be used to prepare students for and determine student readiness for subsequent phases in their professional training, to assess program outcomes or Entrustable Professional Activities (EPAs), and to develop student professional identity and employability. Generally, satisfactory completion of a capstone is a requirement for curricular progression or even for degree completion.

To encourage students to synthesize, integrate, analyze, and reflect, capstone experiences can focus on service-learning, workplace-based experiences, collaboration, research, international work, or even creation of new knowledge such as inventions. These experiences typically culminate in a formal write-up of some kind, be it a research essay, thesis, reflective essay, or even business proposal. Alternatively, capstones can also take the form of high stakes barrier assessments. Regardless of the format of the written assessment, the content challenges students to grapple with the complex and diverse challenges that are encountered at a high level of content understanding.

PROS & CONS:

Positive Aspects/Pros:
- Certain capstones are well-validated (high stakes written barrier assessments, EPA assessments)
- Develops professional identity
- Helps students transition to the next phase in their training (e.g., clinics, employment)
- Helps elucidate critical thinking and reasoning skills
- Provides opportunity for quality feedback and mentorship
- Encourages reflective practice, integration of content, and critical analysis
- High perceived value
- Can be used for curricular outcomes assessment

Negative Aspects/Cons:
- Validated methods of assessment may be limited or nonexistent for certain project-based assignments or research essays, which may subject examinees to subjective biases in their evaluations.
- Assessments of this nature must be associated with appropriate scaffolding, support, training, and feedback so that students understand expectations for performance and evaluation; this may be challenging in the case of international experiences or humanities-based experiences for which students may have limited experience, support, or examples in other aspects of their training.
- Summative, high-stakes nature of the experiences presents barriers to progression for students.
- Resource-intensive and time-intensive to administer and assess

Case Logs

DESCRIPTION:
Case logs, also known as procedure logs, are a method of depicting patient activity including number of patients treated, procedures observed, and procedures performed. Maintenance of case logs have been implemented in medical and veterinary educational models as an easily applicable method of measuring individual clinical experiences of patient encounters and procedures. Case logs may be utilized in all levels of medical training, but the most common application is in advanced training programs for house officers. Common practices for maintaining case logs include hand-written logs, electronic spreadsheets, electronic health record generated reports, web-based platforms, and more recently, artificial intelligence tools. Guidelines for including and describing cases are necessary to reduce variability in reporting. Clinical information such as case number, date of procedure, patient signalment, patient identifier, diagnostic procedures, length of procedure, primary and secondary diagnoses, role of trainee, and location of procedure should be included. Further reflection of the procedure including what skills were utilized, what was learned, what went well, and how the experience could be improved may also be included. Use of medical coding systems may be employed for data entry of these categories. Institutional programs typically have access to the system content, which allows for institutional oversight of patient care encounters and procedures. Audit of case logs may inform institutions of high-yield clinical rotations or be used to compare experiences to learner needs and outcomes.

PROS & CONS:

Positive Aspects/Pros:
- Low cost
- Provides measure of volume and breadth of experience
- Provides rapid objective data of experiences
- Encourages reflective practices
- May correlate with confidence in practice or comfort with procedures

Negative Aspects/Cons:
- Time consuming
- Increased clerical duties
- Relies on self-reporting, which may not accurately reflect experiences (Salazar et al., 2014)
- Does not correlate to trainees' medical knowledge, skill, or clinical acumen (Neumayer et al., 1998; Greenburg and Getson, 1999).
- Coding may be inconsistent (Balla et al., 2016).

Notes

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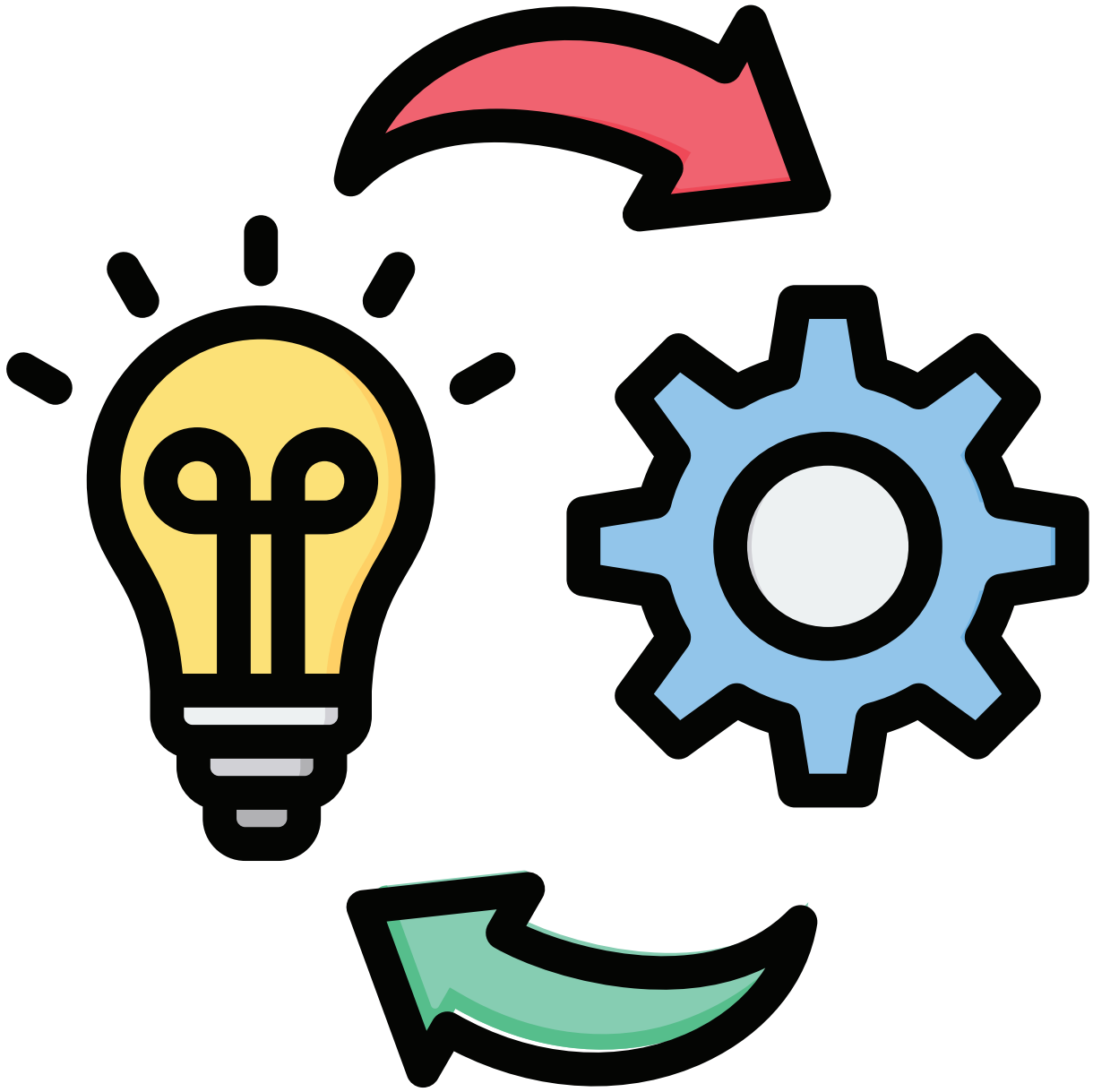
Competency-Based Veterinary Education:

Implementation Strategies



Using CBVE in your program

When implementing the CBVE Model, it is critical to maintain fidelity to the model to allow evaluation of its effectiveness. According to medical education literature, fidelity of implementation broadly includes the following five core components:

- clearly articulated outcomes,
- sequenced progression of learning,
- tailored learning experiences,
- competency-focused instruction,
- and programmatic assessment.[1]

The CBVE Competency Framework provides clearly articulated outcomes for the learner. Milestones describe the expected progression of learners from early training (Pre-Novice 1 and 2) to graduation (Competent) and beyond (Proficient). Tailored learning experiences allow for flexibility in time spent in training, recognizing that learners may not progress at the same rate across all competencies. A learner struggling with a specific competency will take more time to achieve competence. Building in curricular time for additional practice and reassessment (i.e., remediation) is critical to support learner progress. Competency-focused instruction involves teaching to program outcomes and providing feedback to support individual learner progress. Programmatic assessment provides useful feedback to learners by gathering longitudinal data across multiple assessments to support evidence-based decisions on learner progression and achievement of program outcomes. Programmatic assessment is supported by review of critical data with a committee devoted to progress decisions. Faculty development and change management strategies are essential to support the adoption of CBVE.

Over time, fidelity of implementation of the CBVE Model, standardization of assessment forms, and data sharing across institutions will enable evaluation of the CBVE Model and related educational interventions. These efforts, accompanied by scholarly work, will advance the field of veterinary education.

This section provides practical guidelines for helping institutions and faculty implement the CBVE Model as they engage in activities such as the following:

A. Curriculum mapping and alignment in the curricular review process

B. Curriculum redesign

C. Opportunities for customization of the CBVE Model

D. Assessment in the pre-clinical environment

E. Assessment in the workplace

F. Remediation

1. Van Melle E, Frank JR, Holmboe ES, Dagnone D, Stockley D, Sherbino J; International Competency-based Medical Education Collaborators. A Core Components Framework for Evaluating Implementation of Competency-Based Medical Education Programs. Acad Med. 2019 Jul;94(7):1002-1009. doi: 10.1097/ACM.0000000000002743. PMID: 30973365.

CBVE: Implementation Strategies

A. Curriculum mapping and alignment in the curricular review process

The CBVE Competency Framework provides a list of competencies that can serve as program outcomes for curricular mapping. The CBVE Competencies define what graduates should know and be able to do as they complete a veterinary training program. A program's existing course and learning session outcomes can be mapped to the CBVE Competencies to demonstrate alignment and identify gaps. While many mapping tools are available, the simplest way to map competencies is using a spreadsheet that compares existing program outcomes with the CBVE Competencies.

The CBVE Milestones can be used to sign-post the developmental pathway of learners by making expectations explicit at each stage of training and showing the anticipated progression over time. This also leads to a better understanding of the purposeful structural design of the competency-based program and is helpful for learners to identify how foundational instruction early in the program prepares them for the demands and expectations as training progresses.

B. Curriculum redesign

Curriculum redesign or curriculum development requires alignment of intended outcomes, teaching methods, and a program of assessment. The CBVE Competency Framework and the CBVE Milestones guide curricular redesign as they provide the roadmap for learner achievement across the program.

Using the CBVE Competency Framework as a list of pre-determined outcomes accelerates the redesign process by avoiding the slow, often painful process of writing competencies across faculty groups within individual institutions. In addition, it is essential to seek internal and external stakeholder feedback regarding expectations for graduates in the professional workplace. Stakeholder input can then be mapped to the CBVE Competency Framework, assuring them their expectations for graduate performance are met.

C. Opportunities for customization of the CBVE Model

The nine domains of competence and the 32 associated competencies, the milestones, and the eight core EPAs should be maintained across veterinary educational programs. However, programs may choose to develop additional EPAs and subcompetencies to reflect local context and culture. For example, additional subcompetencies may be developed related to diversity, equity, inclusion; well-being; spectrum of care; patient safety culture; public health; or others. The opportunity to customize subcompetencies allows for continual remodeling or evolution of a program's curriculum while maintaining fidelity to the fundamental CBVE components. Opportunities for flexibility in assessment are provided by the CBVE Toolkit and should be selected based upon program needs and resources.

D. Assessment in the pre-clinical environment

Assessment in the pre-clinical environment may include assessment of foundational and clinical knowledge, procedural skills, clinical reasoning, collaboration, professionalism, and communication. In some instances, educational programs incorporate experience in a veterinary workplace as a formal part of early training. The diversity of subject matter and learning environments in veterinary education requires a variety of assessment tools to assess learners. The CBVE Toolkit helps instructors identify specific tools for particular learning activities by mapping each tool to specific competencies.

CBVE Milestones help learners and educators visualize the roadmap for expected learning across the program. Data on individual student and cohort achievement of milestones helps progress committees make decisions regarding student progression and remediation.

CBVE: Implementation Strategies

E. Assessment in the workplace

In-training evaluation reports (ITERs) can be used to document learner progress and to provide feedback to learners about their performance during clinical experiences. Using ITER forms that feature the CBVE Milestones allows learners to obtain detailed information about the level at which they are currently performing and to identify opportunities for growth. The ITERs can also be reviewed across a cohort to provide collective information about cohort development across domains and competencies.

EPAs provide opportunities for observing learner performance in the clinical workplace within varying contexts (e.g., patient, client, clinical presentation). Entrustment-supervision scales are useful when paired with EPAs. Learners typically initiate the interactions and ask for observation by evaluators. Self-evaluation can also be performed. The comparison of ratings and comments between learner and evaluator can lead to rich discussion about what went well and what can be improved next time.

Performing multiple assessments, with different instruments over multiple points in time, is critical when gathering data for programmatic assessment. Performance data may be reviewed by a progress committee to determine if learners are meeting suitable targets for competency achievement set by the program, and to make decisions regarding individual learner progression.

F. Remediation

Students who struggle to achieve the expected milestones can be identified with feedback captured from a variety of assessment tools. CBVE Milestones and EPAs are useful to help frame feedback conversations and help to show learners opportunities for growth. In addition, they may guide conversations for remediation including identifying a comprehensive plan and timeline for performance practice. The remediation plan must consider a holistic view of learner performance (e.g., EPA performance) as well as more granular assessment based upon individual competencies and associated milestones. Showing learners where they have not yet met expectations and helping them to set a clear plan is important to support self-directed learning. Data on student performance across a cohort or between cohorts should be used to develop realistic targets for learner improvement.

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Competency-Based Veterinary Education:

Supporting Resources

CBVE: Supporting Resources

CBVE resources (e.g., the digital CBVE 2.0 Model booklet, FAQs, CBVE Toolkit, CBVE presentations and newsletters, 'Just-in-time' videos) can be found using this QR code, which links the user to the **cbve.org** website. This site is continually updated with the most current resources related to CBVE.

CBVE: Supporting References

A current list of reference publications can be found using this QR code, which links the user to the cbve.org website and the 'Resources – Scholarly Publications' page. References are continually updated to include the latest in competency-based veterinary and medical education literature.

Notes

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