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## **A Survey of Established Veterinary Clinical Skills Laboratories from Europe and North America: Present Practices and Recent Developments**

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## **ABSTRACT**

Developing competence in clinical skills is important if graduates are to be able to provide entry-level care but is dependent on having had sufficient hands-on practice. Clinical skills laboratories provide opportunities for students to learn on simulators and models in a safe environment and supplement teaching with animals. Interest in veterinary clinical skills facilities has increased in recent years as many veterinary colleges face challenges in supporting the development of clinical skills proficiency using traditional methods alone. A survey was designed to gather information from established veterinary clinical skills laboratories with the aim of assisting others considering opening or expanding their own facility. Data were collated from sixteen veterinary colleges in North America and Europe about the uses of their laboratory, the building and associated facilities, staffing, budgets, equipment and supporting learning resources. The findings indicated that having a dedicated veterinary clinical skills laboratory is a relatively new initiative and there have been a range of approaches to implementing and running the laboratory, teaching and assessments. Major strengths were the motivation and positive characteristics of the staff involved, providing open access and supporting self-directed learning. However, it was widely recognised that an ongoing challenge is the increasing demands placed on the facility to provide more space, equipment and staff. There is no doubt that veterinary clinical skills laboratories are on the increase and provide opportunities to enhance student learning, complement traditional training and benefit animal welfare. [236 words]

**Key words:** clinical skills, clinical skills laboratory, clinical skills center, models, simulator

## **INTRODUCTION**

Clinical skills training has a long history in medical education with an obstetrical mannequin being developed in France as early as the 18th century.<sup>1</sup> Clinical skills laboratories began to be established in the 1970s<sup>2, 3</sup> and are now fairly commonplace in medical training, housing a wide range of simulators and models. Other names for these facilities include clinical skills resource centre, clinical skills learning facility, clinical skills unit, skills lab.<sup>4-7</sup> Clinical skills laboratories were designed initially for training medical students prior to their first contact with patients and are increasingly used in postgraduate education.<sup>8-10</sup> The drive for creating clinical skills laboratories was a perceived reduction in patient numbers for teaching, due to fewer beds and shorter periods spent in hospital.<sup>11</sup> There has also been a trend towards reduced bedside teaching with the allotted time for such interactions with patients declining from 75% in 1960 to less than 16% in 1997.<sup>12</sup> Given the need to produce competent physicians, with fewer opportunities for the traditional types of clinical learning and practice, the medical

profession needed to find a suitable alternative and this led to the development of the modern clinical skills laboratory.<sup>11, 13, 14</sup> A major focus of the training in these laboratory spaces is aimed at reducing technical errors and improving patient safety as well as for continuing education<sup>10, 13, 15, 16</sup> and remediation of specifically identified deficiencies.<sup>17, 18</sup> The effectiveness of simulation and training in clinical skills laboratories has been demonstrated for a range of skills as well as in different educational settings.<sup>18-21</sup> Medical simulation-based training programs continue to evolve by adopting techniques used in aviation training and have benefitted from advances in technology including virtual reality.<sup>22-24</sup>

In veterinary medicine gaps have also been identified between traditional approaches to training and the demands of teaching and learning in the modern workplace while trying to prepare students for practice.<sup>25-27</sup> Many veterinary colleges are attempting to broaden the scope of their training to meet the expectations placed on new graduates by society and the profession.<sup>25, 28-30</sup> Several veterinary organizations have developed lists of “day one competences” and “year one skills” (Royal College of Veterinary Surgeons (RCVS) and European Association of Establishments for Veterinary Education (EAEVE)) while others define broad areas of competency expected at graduation e.g. American Veterinary Medical Association (AVMA) and Association of American Veterinary Medical Colleges (AAVMC)).

Veterinary colleges are increasingly required to demonstrate via outcomes assessment that graduates are able to provide entry-level veterinary care. However, a number of factors may limit opportunities for skills acquisition during training including busier workplaces, larger cohort sizes, shrinking budgets, difficulty sourcing cadaver materials and the welfare and ethical concerns around the use of live animals.<sup>31-34</sup> The combination of externally applied accreditation requirements and internally experienced educational challenges have made clinical educators and administrators recognize the need to “do more with less” and yet still produce a highly accomplished entry-level graduate with advanced technical skills.<sup>25, 30, 35-37</sup>

Clinical skills laboratories offer a number of benefits including being student-centered and supporting practice in a safe and relatively stress-free environment without the risk of harming animals.<sup>7, 38, 39</sup> The use of simulators and task-trainer models can improve the ethical standards in humane veterinary education, which is important given modern societal expectations.<sup>34</sup> Veterinary educators are beginning to create their own homemade models wherever possible to provide cost effective alternatives to expensive commercially available models or unsuitable medical simulators, and are sharing their

innovative ideas for learning, teaching and assessing clinical skills via websites (e.g. NOVICE<sup>40</sup>) and at conferences<sup>38</sup> to the benefit of the wider community.<sup>41-47</sup>

Students need to practice repeatedly and at their own pace to become proficient and benefit from expert feedback and reinforcement to improve and maintain skills over time.<sup>48, 49</sup> Clinical skill laboratories allow frequent rehearsal of skills in a safe environment with timely feedback, help provide a more standardized training and, through access to models and supporting learning resources, enable students to supplement their opportunities to learn on animals.<sup>36, 50-53</sup> Also, as the delivery of final year rotations now varies between colleges (from being based primarily in veterinary medical teaching hospitals, to having a number of clinical placements in extra-mural studies, to all rotations being external), clinical skill laboratories can provide a way to allow students to learn and perform clinical skills under faculty supervision before needing to demonstrate skills in less controlled workplace environments.

Assessment of clinical skills is crucial to determine competence and identify areas requiring further practice.<sup>54-56</sup> In veterinary medicine, objective structured clinical examinations (OSCEs)<sup>57</sup> are increasingly used for formative and summative assessment of practical, clinical and procedural skills and test competence at the “shows” level of Miller’s pyramid.<sup>54-60</sup> Clinical skill laboratories provide an ideal venue to run a multi-station OSCE circuit as well as providing students with a venue and equipment to practice in preparation for assessments or to return for remediation.<sup>7, 38, 61</sup>

Veterinary colleges around the world differ to some extent in the outcomes required of their graduates and in the levels of clinical skills training, physical infrastructure and use of clinical skill laboratories. However, all require students to develop their practical handling and clinical skills as part of the curriculum and there is an increasing demand for the development of a clinical skills laboratory to enhance competency in hands-on skills in preparation for, and to complement, training in the clinical workplace. In the current study, a survey was designed to capture information from some of the established veterinary clinical skills laboratories. The aim was to collate data that would be useful to program directors, administrators, faculty and clinical skills instructors involved in designing a new laboratory or expanding existing facilities by providing a range of options to consider and allowing people to reflect on the decisions that need to be made. The project received ethical approval from the University of Bristol’s Faculty of Medical and Veterinary Sciences Research Ethics Committee (ID 12901).

## **METHODS**

The content of the survey was initially informed by a survey of German medical schools<sup>3</sup> and based on the authors' experiences of veterinary clinical skills laboratories including teaching in a range of facilities, visiting other medical and veterinary colleges, and being involved in the set-up of new laboratories. The survey was piloted with colleagues who reviewed the introductory text, questions and answer options. Their suggestions were used to refine the survey during discussions between the authors conducted via Skype. Efforts were made to avoid wording that might prove ambiguous when read by non-native English speakers as the survey participants were likely to be from a range of countries.

The survey was created in the online tool SurveyMonkey<sup>a</sup> and contained an introductory section to gather information about the veterinary college and basic demographic data about the respondent. This was followed by a series of sections to gather detailed information about the clinical skills laboratory including history and background, uses of the laboratory, the building and associated facilities, staffing, initial and annual budgets, equipment and supporting learning resources. The questions were primarily in two formats: short answer (requiring the entry of one to several words) and multiple choice (one answer only or multiple answer i.e. select all that apply). For a few questions respondents could also select 'other' and type an alternative answer. There were also free text questions to capture views about the uses and staffing of the clinical skills laboratories specifically the main strength/s and the area/s most needing improvement with a final question providing an opportunity to record any further comments.

A list of veterinary colleges with established clinical skills laboratories was created by the project team based on visits to such facilities at other veterinary colleges, attendance over a number of years at conferences and workshops focussed on clinical skills e.g. at International Veterinary Simulation in Teaching (InVeST), Veterinary Education Symposium (VetEd), Veterinary Educator Collaborative (VEC) and Association for Medical Education in Europe (AMEE), and from lists in the 'Veterinary Clinical Skills & Simulation' group in the online forum 'NOVICE'.<sup>40</sup> The survey was distributed via email to a known contact at each veterinary college on the list with a covering letter and an embedded link requesting that the addressee complete the survey or forward it to someone more appropriate. Respondents could remain anonymous but were asked to supply details if they were prepared to be contacted by the project team for follow-up question or should clarification be required.

The data were included from completed surveys only, information was summarised and descriptive statistics were generated for some questions. The free text comments were collated and reviewed by two of the authors who hand coded the data to identify themes. The number of participants who made comments related to each theme were recorded. The themes were compared, discrepancies discussed, slight modifications made and agreement reached.

## **RESULTS**

### **Response rate and demographics**

Eighteen veterinary colleges were selected and 16 surveys were completed including by the study authors who responded on behalf of their institutions. The veterinary colleges were in North America (5 in USA, 1 in Canada), the Caribbean (1) and Europe (5 in UK, 1 in Germany, 1 in Austria, 1 in Denmark, 1 in Ireland). The student cohort size per year ranged from 30 to 280 with a mean of 140 and the length of the program ranged from 3.5 to 5.5 years.

Of the 16 respondents, 10 were female and 6 were male, 15 were veterinarians and 1 was a veterinary nurse ('vet tech'). The job titles listed by respondents were in three broad categories: Associate Dean or equivalent (5), Clinical Skills Lead (6), Professor/Associate Professor (5). Irrespective of job title all were involved in a range of activities associated with the clinical skills laboratory including developing models (16) and supporting learning resources (14), teaching (15) and assessment (12). Other activities listed included coordinating the clinical skills program (12) and managing operational matters related to the laboratory e.g. running the daily activities (7), ordering stock (7) and organising staffing for teaching (8).

### **Uses, background and general details of the Clinical Skills Laboratory**

Fifteen veterinary colleges held formal taught classes in their clinical skills laboratory, 14 also allowed open access to students and 13 ran assessments in the laboratory. Other uses included hosting continuing education (continuing professional development) and events for internal and external visitors e.g. public engagement and open days for prospective students.

Fifteen reported that the current facility was their first clinical skills laboratory with one being a replacement for a previous facility. The opening date for the current clinical skills laboratory ranged from 2006 to 2015 with 10 being in the last 5 years (Figure 1).

Five of the veterinary colleges had purpose built clinical skills laboratory while the others had either refurbished existing building/s (10) or shared with a surgery laboratory (1). Twelve were situated close to the clinics and 7 were within the main student learning complex, 3 of which were also close to the clinics. The number of rooms ranged from 1 to 22, with half having more than 3 and a mean of 4.8 rooms. All described a room that was used as a dedicated teaching space, often quite large with dimensions (when listed) between 25m<sup>2</sup> and nearly 700m<sup>2</sup> and all had space or room/s for storage. Most described adjacent rooms that were assigned for specific types of teaching. Some were for species related skills including small animal (3), equine (3) and farm animal (4) while others were for diagnostic imaging (3), laboratory skills (1) and ophthalmology (1). Rooms for supporting activities included an office (4) and a preparation room (3).

The start-up funding had in most cases (14) come from the university with additional major contributions coming from government grants (4), corporate sponsors (4), trusts (3), alumni (3) and one mentioned under 'other' money raised by students (Figure 2).

The main areas to consider for inclusion in the annual budget (i.e. to cover ongoing costs) were reported as being 'consumables' to run teaching activities and assessments (with such costs when mentioned ranging from \$5,000 to \$20,000 per annum) and for ongoing developments particularly making new models. Other costs were for staff to manage the clinical skills laboratory and for teaching but these were often embedded in the main teaching budget and therefore people were unable to provide specific figures.

### **Staffing, teaching and assessment in the Clinical Skills Laboratory**

When asked about the staffing of the clinical skills laboratory 7 had a laboratory manager, 10 had a specific academic lead, 12 had veterinary nurses ('vet techs') or other technicians working in clinical skills laboratory and 6 had students involved in some capacity (other than purely as learners). The teaching and assessment were delivered predominantly by faculty, residents and veterinary nurses but some also used interns, students (peer or near-peer assessment) and non-veterinary technicians (Table 1).

The group sizes for teaching varied from 1:1 up to 1:>30 (ratio of number of people teaching to number of students in a 'group') with the most frequently used ratios being 1:3-5 (11), 1:6-10 (10) and 1:11-20 (9).



## Equipment and supporting learning resources

Respondents were asked about their use of models (low- and high-fidelity), cadavers and live animals and the relative percentage of each. All used low-fidelity models which represented between 5 and 100% of their overall teaching 'material'. Eight used high-fidelity simulators (range 5 – 50% of overall teaching 'material'), 8 used cadavers (range 10 – 60%), and 9 used live animals (range 5 – 50%).

Equipment was supplied to students (in addition to during taught practicals) in a variety of ways: 7 on a sign-out basis only, 7 predominantly free access and 2 had a limited amount freely available. All provided supporting learning resources in their laboratories and in a variety of formats the commonest being videos (15), skills instruction booklets (13) and large screen monitors (11) with 5 providing laptops and/or tablets. In addition to their college's standard virtual learning environment, 5 had a specific webpage for their clinical skills laboratory and 3 had a Facebook page, 2 of which also used Twitter. Only 4 used an online booking system for the laboratory.

## Free text questions

Respondents were asked to describe the main strengths of the ways their clinical skills laboratories were used. All listed one or more strengths and several themes emerged including 'open access' (6) and the opportunity for 'self-directed learning' (5) allowing students to *"spend a significant amount of time practising"* with three commenting on the need for good quality supporting learning resources although one also added a note of caution that *"when it [self-directed learning] doesn't work it is our greatest weakness"*. Other minor themes listed under 'strengths' related to the 'dedication of faculty' (3), the 'enthusiasm of students' (3), the value of activities being 'integrated into the curriculum' (3) and 'use for assessments' (2). The overall ethos is captured in one quote: *"Students can learn and develop basic manual dexterity and skills in a safe, welfare friendly environment"*. When specifically asked to consider the main strengths of the staff in their clinical skills laboratories 14 responded. The major theme was the 'positive characteristics' (9); staff were described as motivated, enthusiastic, approachable, kind, caring, willing to learn, *"devoted to clinical skills"* and *"love teaching and developing teaching resources"*. A few other comments related to the value of having teachers from first opinion practice (2) and the engagement of students in teaching or peer-assisted learning (2).

Fifteen respondents listed areas that they considered needed improvement and the overwhelming theme related to having 'more' space (5), staff (4), integration into the curriculum (3), models (3), assessment (3), open access (2) and supporting learning resources (2) and one mentioned wanting an

online booking system. The final question asked for any other comments with responses including specific reference to the “*transformative effect [of the clinical skills laboratory] on the student learning experience*”, the challenges around supporting the ongoing growth of the laboratory and associated learning resources, and a suggestion that there might be an opportunity for further collaboration e.g. “*working together to train instructors*”.

## **DISCUSSION**

An increasing number of clinical skills laboratories have been set up and established in veterinary medicine during the last decade for both teaching and assessment of technical skills.<sup>7,38, 41, 61</sup> Simulation and outcome-based education have also grown over the same period and have been reported to help ensure competence and confidence in graduates.<sup>26, 27, 36, 41, 43-47, 51</sup> . We developed a survey to gather information about some of the considerations and decisions made when setting up a veterinary clinical skills laboratory, and to report the current state of operation of some of these facilities. We specifically solicited information about the daily operation and use of the laboratory space within the program at each veterinary college.

The veterinary clinical skills laboratories included in this survey represent a cross section of programs in various locations, with varied cohort size, training program type and program length. The one feature in common for all of the survey respondents was their development of and use of a clinical skills laboratory between 2006 and 2015. The list of veterinary colleges surveyed was by no means comprehensive but instead represented laboratories that were well known and appeared to be **well-established to the project team. The authors decided these might serve as a basis to provide information to what is a rapidly emerging veterinary clinical skills community about laboratory set up and operation.**

The respondents were primarily female veterinarians, distributed across broad position categories of Associate Dean or equivalent, Clinical Skills Program Lead, and Professor/Associate Professor. These individuals seemed to administer many aspects of the laboratory function including coordinating the program, managing daily operations, organizing staffing and supplies. This need for administrative time and skill is useful to know when considering hiring key faculty positions to develop a clinical skills laboratory or when reassigning faculty from another role to lead a clinical skills laboratory

Successful implementation of the laboratory requires appropriate staffing but there does not appear to be one uniform solution as to how this is achieved. Most programs surveyed seemed to rely on technical staff or a laboratory manager to work in the laboratory setting out supplies, working with students and

providing day to day restocking and clean up. The faculty, residents or veterinary nurses (registered animal health technicians or 'vet techs') performed the majority of the instruction in the laboratory. Peers were sometimes used in the laboratory, as were interns or non-veterinary technicians. Many programs incorporated different people to teach and train students. Solutions to staffing a clinical skills laboratory are often dictated on personnel and financial resources available.<sup>62</sup> No matter who the teachers are in these laboratories, the qualitative aspect of our survey results would suggest that dedication to students, enthusiasm, approachability, kindness, caring and a love of teaching were considered important by many respondents. Teachers coming from first opinion private practice were also employed in the clinical skills laboratories and had possibly migrated to the academic institution due to a strong desire to teach. In order to be successful, it has been shown elsewhere that clinical teachers need to know their field exceptionally well, possess enthusiasm for the subject matter, set clear and challenging expectations, and provide frequent and relevant feedback.<sup>63</sup> The competencies and skills required of a day one graduate are arguably best known by a first opinion practitioner rather than a specialist with expert knowledge who may find it hard to relate to entry-level competence.<sup>64</sup> Developing the list of skills to be taught and materials to be developed should be done in consultation with first opinion veterinary practitioners and technical staff, to avoid creating irrelevant materials to the workplace of a new graduate.

Supporting materials for teaching and learning were most commonly provided using videos, skills instruction booklets, with step-by-step photographs or instructions, and large screen monitor displays. A few were also using laptops or tablets for access to materials, and had established a webpage as well as an online use booking system. The larger the program, the more need to book the space in advance and place an emphasis on materials for self-directed learning and resetting a station after use. Teaching equipment was used on a sign-out basis for half the programs and the rest provided them in some form of free-access manner (to all equipment or selected pieces at a time). Evidence supports the use of videos in veterinary clinical skills teaching and emphasizes the need for accessibility, good quality images and sound, as well as relevant content.<sup>65</sup> Use of online clinical skills learning resources is also known to be advantageous for the student to be able to access the materials anywhere at anytime.<sup>66</sup> This style of learning material may become more important in the future as there is a greater emphasis on external practicum experiences as part of the clinical teaching and learning experience.<sup>66</sup> Access to such resources for review is also important as students move beyond the practice laboratory into the workplace.<sup>66</sup> In veterinary medicine there has been a recent interest in collaborating between colleges

to share videos and web-based resources for teaching and learning.<sup>53</sup> Given the expense of these items and the time it takes to create them, it makes sense for educators to share them across programs. In 2005, AAMC noted that educational scholarship is a vital part of the review of a medical educator's performance. They defined educational scholarship as "any material, product or resource originally developed to fulfil a specific educational purpose that has been successfully peer-reviewed and is subsequently made public through appropriate dissemination for use by others".<sup>67</sup> As clinical skills laboratories develop we should encourage programs that provide excellent teaching in their laboratory to share their materials more publically to allow a wider audience to benefit (e.g. other veterinary colleges, practices, charities and students), for the resources to be open for critique and evaluation, and to provide a platform on which others can build.<sup>67</sup>

From the survey responses obtained, it was clear that most programs use the laboratory space to teach formal classes, as well as to allow access for practice purposes outside of class time. Many also use the space to conduct assessments, both formative and summative. A few use the space for hosting continuing education and public engagement events. Clinical skills laboratories act as a good showcase for these veterinary programs and several commented that external stakeholders and donors are often toured through the facility. As described in the introduction, the purposes for clinical skills laboratory use in veterinary medicine are similar to those noted in medicine. More recently, residency training in medicine has evolved into a competency-based framework with greater emphasis on skills performance, and less on time spent in training.<sup>68</sup> In these programs, trainee gaps are identified and the individuals are required to remediate before advancing to the next step of their training. In our survey, no respondent reported the use of the laboratory space for remediating veterinary graduates with deficiencies, although this would be a logical use of clinical skills laboratories for post-graduate trainees and could include individuals identified as part of disciplinary hearings with their local veterinary organization. Perhaps as the competency-based education culture takes a deeper root in veterinary medicine there will be a future emphasis on identifying poorly performing practitioners and remediating them. This has been explored elsewhere in veterinary medicine but is relatively new to procedural skills training.<sup>69</sup>

Most of the veterinary colleges in this survey reported that the skills laboratory was their first facility, with only one reporting the replacement of a previous facility. Most of the clinical skills laboratories were situated close to the clinical buildings (in an on-campus hospital program) or within the main student-learning complex otherwise. Most existing clinical skills laboratories in medicine are reported in

one central building instead of using multiple separate locations.<sup>70</sup> The major advantage of being in close proximity to clinics, or within learning complexes is that the students are nearby.<sup>70</sup> Ideally, most of the skills laboratories provide an open access area for students.<sup>71</sup> This facilitates “drop-in” for repeated practice as students strive to develop ‘mastery’ of key skills and the opportunity for self-directed learning.<sup>71</sup>

There was a wide variety of sizes for clinical skills laboratories in this survey. Such variation is likely to relate to program needs, budgets and the prior existence of functional space. The laboratory spaces varied in size from one room to twenty-two rooms typically including at least one large dedicated teaching area. Others have reported the overall area of the buildings ranging from below 1,000 to 80,000 square feet.<sup>61</sup> Similarly, in a survey of German speaking medical schools, the size of existing skills laboratories varied from less than 328 to 8,200 square feet equipped with three to thirty-one rooms.<sup>3</sup> Interestingly, the American College of Surgeons accreditation process has stated that 5,200 square feet should be a minimum requirement for a comprehensive surgical laboratory while other authors have noted that even a small laboratory space should be at least 500 square feet.<sup>72</sup> Determining a specific square footage for informing future veterinary construction is clearly problematic and accreditation standards to date do not include specific recommendations. Individual program space requirements depend on student cohort size, curriculum integration, number of personnel and budget available. If a prior space is being adapted for a clinical skills laboratory then often the size is dictated by what is available which may place constraints on its use in the curriculum. Most respondents noted the ongoing need for more space and having adequate storage helps to reduce costs long term by avoiding damage to or theft of expensive equipment and models.<sup>71</sup>

Existing clinical skills laboratories were funded and created through a variety of sources, with the most common being funds from the university. Government grants, corporate sponsors, trust funds, alumni donors and students were also sources of funding. Veterinary medicine is more limited in funding opportunities for clinical skills laboratories and simulator training facilities compared to medicine. Patient safety is often an important motivator for public funding in human health, and as an example of the messaging used, the University of Texas-Houston Medical School introduced a new skills laboratory saying “no patient harmed in the making of this physician”.<sup>73</sup> Welfare and safety of animals is an important consideration in veterinary medicine, and improving productivity and efficiency of practitioners in animal industries could be an important motivator for funding that is yet untapped. The full costs of running a clinical skills laboratory are difficult to determine from the survey results but this

is likely a limitation of the questions asked. We noted that many programs did not account for the required staff and salaries in reporting their operating costs (staffing being within the general teaching budget), while some respondents did. After facility development, clearly staffing is the single largest expense and an on-going annual financial commitment. It would probably be helpful to have greater transparency around all the costs related to running the clinical skills laboratory on an annual basis, which would also allow for easier forward budgeting for changes in cohort size or for enlarging the clinical skills program within the curriculum; the majority of respondents noted an increasing demand on their facility whether it was more space, staff, integration into the curriculum or teaching resources. When considering the responses provided regarding the consumables used when running a clinical skills laboratory costs ranged from \$5000 to \$20 000 (US) per annum. There are opportunities to minimize costs by acquiring consumables that have expired from hospitals, other clinical settings or institution's recycling sites.

One of the major additional expenses in conducting a clinical skills program appears to be the affordability of simulators from commercial sources and many programs are reporting the development and use of homemade items instead as a cost-saving measure.<sup>7,38,41</sup> Reports in the literature show that low and medium fidelity models can be just as effective as high fidelity so there is some educational merit in this cost savings.<sup>74</sup> Additionally, there is a growing preparedness to share ideas and the 'recipes' for making models and sourcing materials via forums<sup>40</sup> and skills videos via YouTube.<sup>53</sup> Assessing student performance is also an added cost that was not clearly separated out and identified in our survey. Not all of the respondents were using OSCEs so perhaps this is appropriate and a second survey is being planned which intends to include more detailed questions of this nature. It is clear that OSCEs are not inexpensive and some in medicine are very critical of the costs associated with high stakes post graduate OSCE citing \$100 000 spent in some cases.<sup>75</sup> OSCEs use a large amount of consumables, require a lot of man power to set up and conduct and may incorporate external assessors who require training and cost support.<sup>75</sup> For these reasons, some programs choose not to implement these assessments but without their inclusion it is hard to demonstrate competence in technical skills.<sup>75</sup> Some programs prefer to provide documentation of skills proficiency using web-based programs or paper-based passports.<sup>76</sup>

### **Limitations**

Limitations of our survey are noted and may affect the usefulness of the results.. As discussed above, respondents seemed unclear on the exact nature of what should be included in the annual budget and

some respondents were also unclear if the clinical skills laboratory was the single room in a larger facility where students practiced or whether it meant the entire clinical learning facility including offices and storage rooms. Despite pilot testing of the survey prior to use there was still some misinterpretation of the questions as worded. In retrospect, it would have been more useful to provide a question that asked them to check off all rooms from a list but when the survey tool was developed the authors decided not to be prescriptive with a list for fear of leading respondents and potentially excluding rooms. The idea of the survey was to gather as much useful information as possible that might be passed on to colleagues considering design of a facility in the near future.

Another limitation of our survey includes the sample size. Teaching of clinical skills in veterinary medicine is not new and a range of models have been available for many years. However, the incorporation of a wide range of models with the addition of technology and simulation in a dedicated area is different to the provisions made for students in the past. There has also been an increasing emphasis on open access and self-directed learning. Although academic veterinary medicine is a relatively small field, and the establishment of clinical skills laboratories as defined here is still a recent phenomenon, the survey respondents were highly engaged and provided detailed information. The survey was only sent to 18 programs that were identified by the authors as those who had successfully established a high profile clinical skills laboratory (e.g. had hosted international visitors, workshops, conferences, etc.) and the information presented here draws on their responses. Since the survey was drafted and sent out, other clinical skills laboratories have been established and the authors are encouraged to see the field expanding at a rapid rate. This may lay the foundation for further surveys and study in the future. What is presented here is a “snapshot in time” and undoubtedly this will change rapidly in the next 5 years. As more laboratories are established in the future, further broader surveys could be undertaken to evaluate if there are differences based on national needs, and to evaluate if the issues and barriers are similar for more recently developed facilities as for those established at an earlier date. Also future surveys might include questions regarding training of faculty members in teaching and assessment of clinical skills as those themes have not been explored in the current study.

Finally, the use of free text questions could also be seen as a limitation of the study given the number of responses. The qualitative comments collected were shared in the results section in order to provide some additional information. While limited to the opinions of a small group it was extraordinary how common the experience and comments between them was.

## CONCLUSIONS

The survey results represent a current state of veterinary clinical skills laboratories and provide educators who are in the process of establishing or expanding a clinical skills laboratory or program with some guidance based on the experiences and lessons learned by a group of international colleagues. Important considerations are staffing, creation of learning materials, development of supportive technology, establishing and developing the space while also making good use of what is already available, funding and integration of the clinical skills laboratory into the curriculum. The implementation of a competency based framework for veterinary education will further increase the demand for veterinary skills training and is likely to drive the expansion or introduction of spaces that support hands-on learning in a safe controlled environment.

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