The iVTG:
also an appropriate *veterinary* progress test?

Performance of third-year veterinary students on the progress test iVTG

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Contents

Abstract

Progress testing is not common in the curriculum of the Faculty of Veterinary Medicine in Utrecht, although medical curricula are used to this form of testing. The medical curricula in the Netherlands have the interuniversity Progress Test of Medicine [in Dutch: '*interuniversitaire VoortgangsToets Geneeskunde'*], also known as the iVTG. Both veterinary and medical curricula prepare students in a comparable structured pre-clinical Bachelor, therefore this iVTG could be also an appropriate veterinary progress test. The aim of the study was to gain insight into the results of third-year veterinary students compared to the results of third-year medical students on the overall iVTG and on different disciplines and categories of the iVTG. The second aim of the study was to research if the iVTG databank could (partially) be used as a question databank for a veterinary progress test.

The comparison between third-year veterinary students (VET) and their third-year medical counterpart students (MED) provided insight in the level of similarity between their knowledge and competences. VET scored lower on the overall iVTG and on categories of the iVTG when compared to MED, but do have the same or even better score on specific disciplines of the iVTG. Prior to the test, the questions of the iVTG tests were scored by relevance to veterinary students' knowledge and understanding, as described in the veterinary program outcomes. Based on the significant similarity in scores between VET and MED on questions in relevance category 1, especially in disciplines like ANA, BCG, EMS and FY, the iVTG could partially be used as a databank for a veterinary progress test. Progress testing in the veterinary curriculum was found useful by veterinary students.

Introduction

In the Dutch veterinary curriculum, the importance to assess the growth in functional knowledge and competence for each student is risen[3, 8, 20, 23]. Therefore, progress testing (PT) is functional, which is a longitudinal, comprehensive, and cross-sectional test approach based on equivalent assessments given at fixed intervals. PT is independent of the educational program and is used in medical curricula in the Netherlands since 1977[11, 14, 26].

For example, the *'interuniversitaire VoortgangsToets Geneeskunde'* (iVTG), also named the 'Dutch interuniversity Progress Test of Medicine', is used in six of the eight medical faculties in the Netherlands. The iVTG consists of 200 multiple choice questions, based on the program outcomes of the curriculum[26, 27, 29]. The test is norm referenced with the use of negative marking and uses a discontinuous scale to grade students over every four measure points, which is equal to one year. Combining the results on the repeated assessments increases both the reliability of pass-fail decisions and its predictive validity[14, 26].

Inter-institutional comparisons between medical curricula are common, but since there is only one veterinary medicine curriculum in The Netherlands, the need to compare the veterinary curriculum to the medical ones might be of value[2, 4, 9, 18, 28]. Both curricula have a problem-based learning context and their structure consists of three years of Bachelor, mostly theoretical, and of three years of Master, both theoretical and practical. PT can be used in a collaborative fashion by sharing test production and administration, which is not only more cost-effective but also a rich source for continuous benchmarking and quality improvement[1, 17, 26]. In Germany and Austria, the Berlin Progress Test is carried out in 13 medical schools. This test started as a student initiative and is provided as a strictly formative assessment of medical knowledge[11].

In the Dutch veterinary curriculum, there is not yet such a PT running each year for every student, although some experience is present[8]. The reason for the absence of a veterinary PT is probably twofold: the utility of the testing procedure is not easily understood and PT can be logistically burdensome[11]. In contrary to that, research demonstrates many advantages. One of the major advantages is the stimulation of students' continuous learning instead of test-driven learning. Besides that, repeated assessments produce superior transfer of learning relative to repeated studying[5, 12]. On top of that, PT allows students to get insight into their level of knowledge and specifically allow them to recognize in which disciplines and categories they can improve. In addition to that, the need for resit examinations is removed, early detection of high achievers is allowed and stability in assessment procedures is brought, provided the program outcomes are unchanged[24]. Furthermore, the faculty can use the results of the PT to benchmark students' level and evaluate the study programme by means of the program outcomes[6, 30].

To explore the opportunity for a veterinary progress test by using the iVTG, third-year veterinary students (VET) were asked to make an iVTG to compare their results to those of their third-year medical counterpart students (MED). In addition, the veterinary relevance of the questions in the different disciplines and categories of the test was scored by the researchers and linked to the results.

Materials and methods

Participants

Veterinary students at the Faculty of Veterinary Medicine in Utrecht (FVMU) in the third-year of their studies, nearby ending their pre-clinical Bachelor, were invited to sit the iVTG. These specific students are chosen, because their moment in the studies was best comparable with the end of the medical pre-clinical Bachelor (test moment number 12). To motivate the third-year veterinary students to cooperate with the study, they were instructed about the aim and importance of the study.

Outcome

The results of the third-year veterinary students on the iVTG progress test, developed for the medical curriculum, were compared to the results of medical students at the end of their pre-clinical Bachelor. Besides that, all questions were scored on relevance to the veterinary program outcomes and these scores were given both on the overall iVTG and on different disciplines and categories of the iVTG. The students' results and the relevance score to the veterinary program outcomes, gave an indication if the iVTG databank could (partially) be appropriate to be used as a question databank for a veterinary PT.

Data analysis

Descriptive statistics in Microsoft Excel® were used to explore reliabilities and differences in results between the two groups. For every discipline and category, set up by the iVTG, these comparisons were made[14]. The medical students' results of UMCG (2015) and UMCN (2016) are used to compare to the veterinary students' results. The use of iVTG September 2015 gave no medical student results on measure point 12, so the results of measure point 13 are used instead. For the iVTG May 2016 the medical student results on measure point 12 are used. The statistics for the research consisted of performing a T-test (two-sample assuming equal variances) in Excel® after the equality of variances was tested in Excel® via an F-test (two-sample for variances). Discipline KG was the only exception with unequal variances, which was the reason that another T-test (two-sample assuming unequal variances) was used. For disciplines GER, MET, PS, SG and category 3 only one question was in relevance category 1, thus no statistics could be used on these results.

The progress test

The veterinary students were approached in the same way as medical students were approached when taking the progress test. Differences were the conditioning of medical students in taking a PT, the standard implementation of and experience with the iVTG in the medical curriculum and the analogy of the tested knowledge with the program outcomes of the medical curriculum. Third-year veterinary students had a first time in making a PT including the 'don't know' option and the tested knowledge was just partly similar to the program outcomes of the veterinary curriculum. In addition to these differences the veterinary students conducted the test in 2016 via a digital testing programme (RemindoToets®). Taking the test in a digital manner was the first time in the history of the iVTG, but the veterinary students were used to digital testing. In 2017, the iVTG was taken in the available paper-form.

Study design

The iVTG was scored on relevance to the program outcomes of the Veterinary Medicine curriculum of the Faculty of Veterinary Medicine Utrecht (FVMU) ('veterinary relevance'). Seven persons involved in veterinary education marked the questions considered to be "irrelevant" (0), "relevant" (1) or "semi-relevant" (½), resulting in a score between 0 to 7. The derived relevance score is divided in three categories: 0 to <3 (-1; irrelevant), 3 to <5 (0; neutral) and >5 (1; relevant). Directly after sitting the PT, a short questionnaire was filled out by the students to evaluate their experience with and opinion on the iVTG. Data were collected via RemindoToets® and put in Excel® to perform statistics.

Hypotheses

Research question 1: did third-year veterinary students score differently on the overall iVTG and on different disciplines and categories of the iVTG?

H0: The results of third-year veterinary students on the progress test, developed for the medical curriculum, were the same results as third-year medical students'.

H1: The results of third-year veterinary students on the progress test, developed for the medical curriculum, were not the same as third-year medical students'.

Not the same results could mean not the same results on the overall test or not the same results in the different disciplines and categories.

Research question 2: could the iVTG databank (partially) be used as a question databank for a veterinary progress test?

H0: The iVTG databank could (partially) be used as a question databank for a veterinary progress test.

H1: The iVTG databank could not (partially) be used as a question databank for a veterinary progress test.

Partially can mean the usability of some disciplines and/or some categories.

Study procedure

At the begin of June 2016, the iVTG September 2015 was taken as a voluntary assessment for third-year veterinary students. For this test the questions of the available paper-form were transferred into the database of RemindoToets®. The Chromebooks of the University of Utrecht were used to take the tests. The results of the veterinary students were compared to the results of measure point 12 of the medical students of the University Medical Center Groningen (UMCG). In May 2017, the assessment was repeated with the iVTG May 2016, to make the comparison more accurate and reach more third-year veterinary students. This time the test was taken in the available paper-form and compared to the results of the medical students of the University Medical Center Nijmegen (UMCN).

Results

After the assessment of the iVTG September 2015, four questions of the test were left out of the test results (14, 49, 78 and 113), so 196 questions were used for the comparison, together with the 200 questions of the iVTG May 2016. In the comparison of the results, the abbreviation VET was used to represent the third-year veterinary students and the abbreviation MED was used to represent the third-year medical students.

Comparison of the iVTG results

1) Did VET score differently on the overall iVTG and on different disciplines and categories of the iVTG, compared to MED?

2016

The norm to pass the test for MED over measure points 9 to 12 was as follows: <27,77% = insufficient, 27,77% - 40,43% = sufficient and >40,44% = good. When this norm was used to grade the VET (n = 28), all of them would have an insufficient grade with a mean of 14% [5% - 26%]. On the overall iVTG the VET scored on average 23% less good answers on the questions, ranging from -32% to +86%, compared to MED. VET used the 'don't know' option on average 29% more than MED, with a ranging from -30% to +79%. The mean scores of individual MED was not researched.

In figure 1 the results compared per discipline is shown. The MED scored on average a more equal percentage on every discipline than VET, while the VET scored for example the same or even higher percentages on BCG and FY, but missed knowledge in other disciplines.

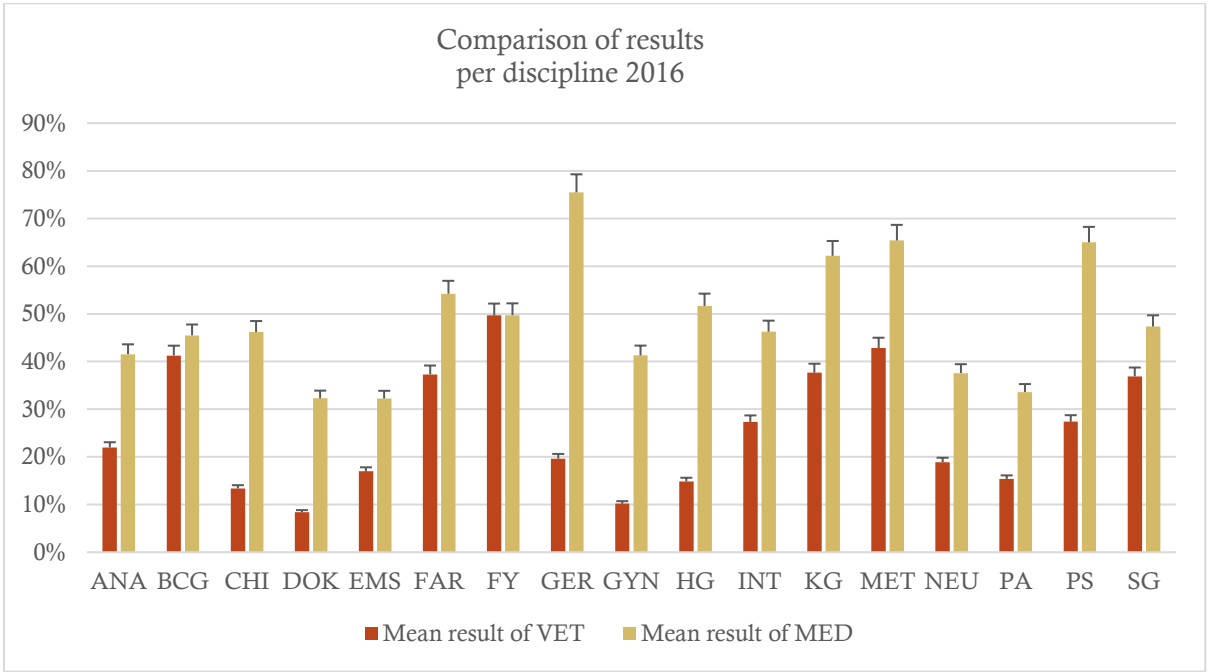

Figure 1 Comparison of mean results of VET (veterinary students) and of MED (medical students) per discipline 2016.

In figure 2 the results compared per category is shown. The MED scored on average a higher percentage on every category than the VET.

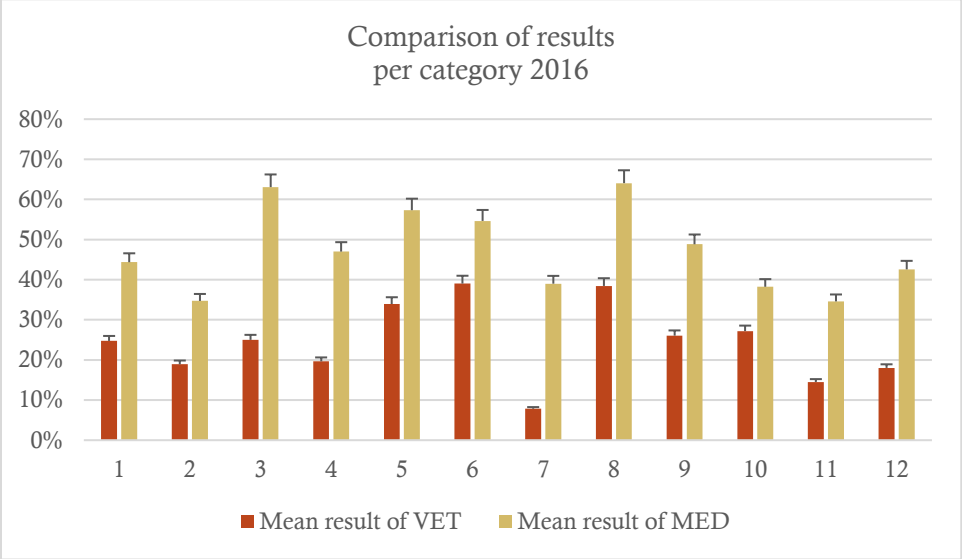

Figure 2 Comparison of mean results of VET (veterinary students) and of MED (medical students) per category 2016.

2017

On the overall iVTG the VET scored on average 16% less good answers on the questions, ranging from of -80% to +85%, compared to MED. VET used the 'don't know' option on average 23% more than MED, ranging from -42% to +93%.

In figure 3 the results compared per discipline is shown. The MED scored a higher percentage on every discipline than the VET, but the magnitude of the difference depended on the discipline.

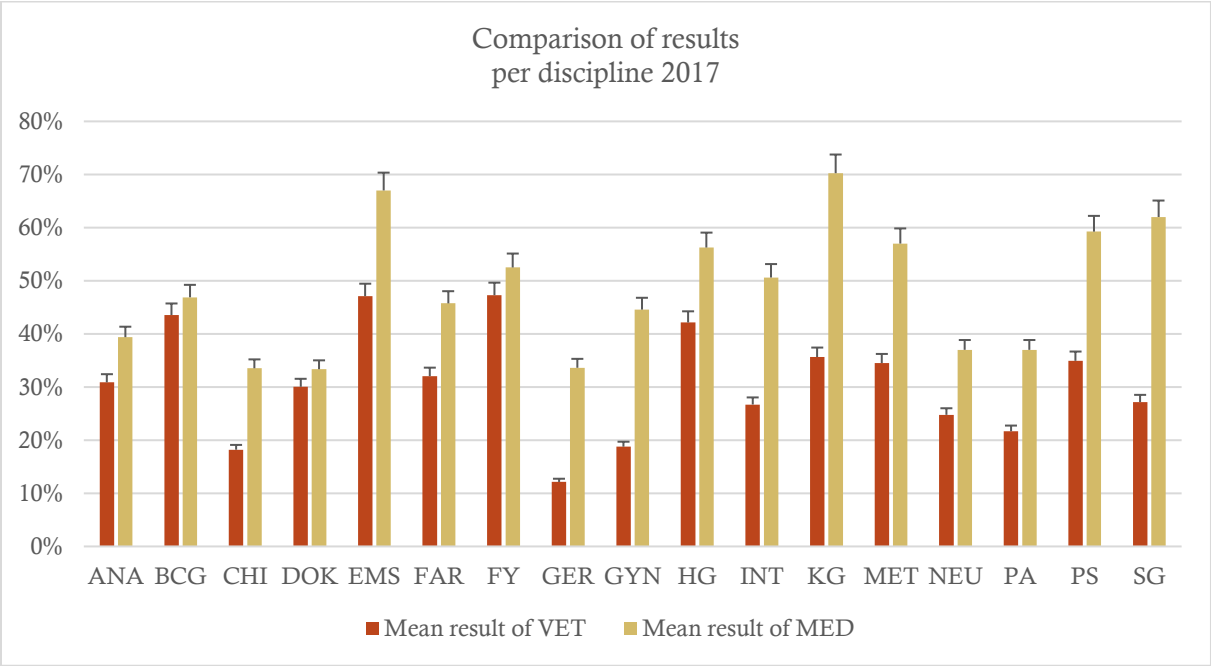

Figure 3 Comparison of mean results of VET (veterinary students) and of MED (medical students) per discipline 2017.

In figure 4 the results compared per category is shown. The MED scored on average a higher percentage on every category than the VET.

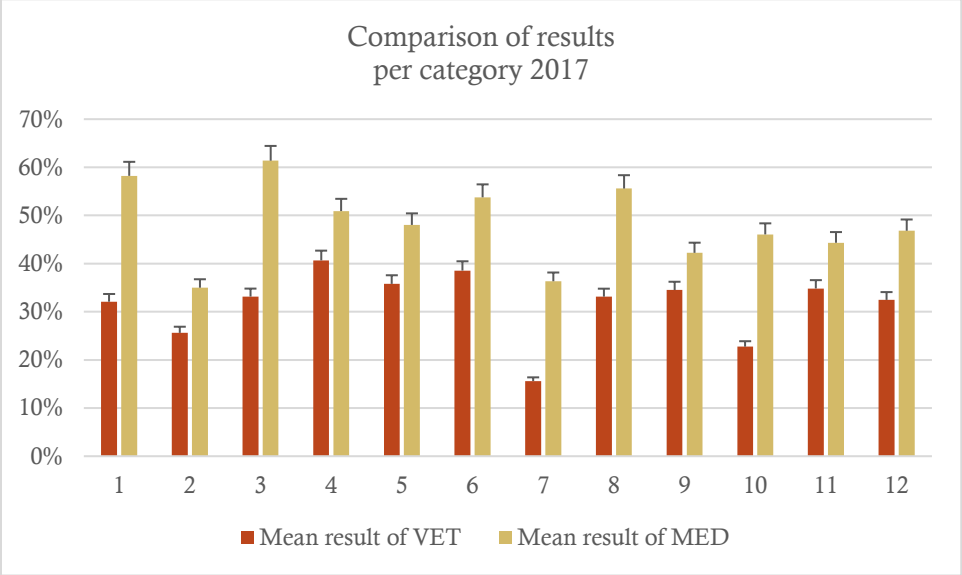

Figure 4 Comparison of mean results of VET (veterinary students) and of MED (medical students) per category 2017.

Usability of the iVTG

1) Could the iVTG databank (partially) be used as a question databank for a veterinary progress test?

The differences in scores were divided in results on the overall iVTG and on different disciplines and categories of the iVTG. The students' results and the relevance score to the veterinary program outcomes, gave an indication if the iVTG databank could (partially) be appropriate to use as a question databank for a veterinary PT. In table 1 the amount of questions per relevance score and the allocation to a relevance category is given: irrelevant (-1), neutral (0) or relevant (1). The questions of both iVTG tests were combined and only those from relevance category 1 (relevance score ≥ 5, table 1) were used for further analysis of the usability of the iVTG.

Relevance score	# of questions (2016)	# of questions (2017) *	Relevance category
0	57	47	-1 (n = 194)
0,5	4		
1	25	23	
1,5	2		
2	11	22	
2,5	3		
3	10	22	0 (n = 64)
3,5	3		
4	14	12	
4,5	3		
5	16	19	1 (n = 142)
5,5	3		
6	15	22	
6,5	2		
7	32	33	

Table 1 Indicated veterinary relevance of iVTG questions and relevance category;

** half points were not allowed to give to questions of the iVTG May 2016.*

In table 2 the disciplines and categories are explained and the number of questions with a relevance category 1 out of the total number of questions per discipline and category are displayed. The amount of questions in category 1 gave an indication about the use of these questions from specific disciplines or categories for a veterinary databank. The p-value in table 1 pointed out the significance in difference between the MED and VET scores on those questions, only taken in account the questions in relevance category 1. These p-values are determined by using an F-test (two-sample for variances) and T-test (two-sample assuming equal variances) in Excel®.

Disciplines	# of questions	p-value	Categories	# of questions	p-value
ANA: Anatomy	19 / 26	0.289	1: Respiratory system	11 / 27	0.258
BCG: Biochemistry	28 / 36	0.941	2: Musculoskeletal system	16 / 34	0.258
CHI: Surgery	5 / 33	0.149	3: Mental health care	1 / 30	n/a
DOK: Dermatology, ear, nose, throat & eye	6 / 28	0.278	4: Reproductive system	6 / 23	0.684
EMS: Epidemiology & statistics	11 / 16	0.226	5: Cardiovascular system	26 / 55	0.335
FAR: Pharmacology	7 / 17	0.979	6: Hormones & metabolism	16 / 27	0.738
FY: Physiology	20 / 23	0.917	7: Dermis & connective tissue	2 / 22	0.637
GER: Geriatrics	1 / 16	n/a	8: Personal & social aspects	4 / 34	0.924
GYN: Obstetrics & gynaecology	2 / 14	0.273	9: Digestive/gastrointestinal systems	13 / 34	0.346
HG: General practice	5 / 38	0.912	10: Kidneys & urinary tract	11 / 29	0.571
INT: Internal medicine	16 / 52	0.088	11: Nervous system & senses	14 / 35	0.874
KG: Child medicine	7 / 23	0.101	12: Knowledge skills	19 / 46	0.361
MET: Metamedics	1 / 10	n/a			
NEU: Neurology	5 / 14	0.724			
PA: Pathology, immunology & microbiology	4 / 20	0.871			
PS: Psychiatrics/psychology	1 / 24	n/a			
SG: Social medicine	1 / 6	n/a			

Table 2 Disciplines and categories of the iVTG including the amount of questions in relevance category 1 and their p-values.

To test the veterinary relevance score per discipline or category of the iVTG, a comparison in results between VET and MED was made. The mean of both groups is taken, because some questions are always found more difficult by students than other questions. The mean results of cohorts of students also varies in between tests, because a major concern with PT is ensuring the equivalence of the individual tests, which is the reason question of two tests were taken in account[3].

Figure 5 shows the mean VET and MED scores per discipline. These scores gave an indication for the usability of the question databank of some disciplines for a veterinary test. In Excel®, the significance was tested with an F-test and a T-test, which resulted in the p-values shown in table 2. All disciplines had shown no significant difference ($p > 0.05$) between the VET and MED scores, but differences between certain disciplines were showed. For the disciplines with only one question in relevance category 1 (GER, MET, PS, SG) the significance could not be tested.

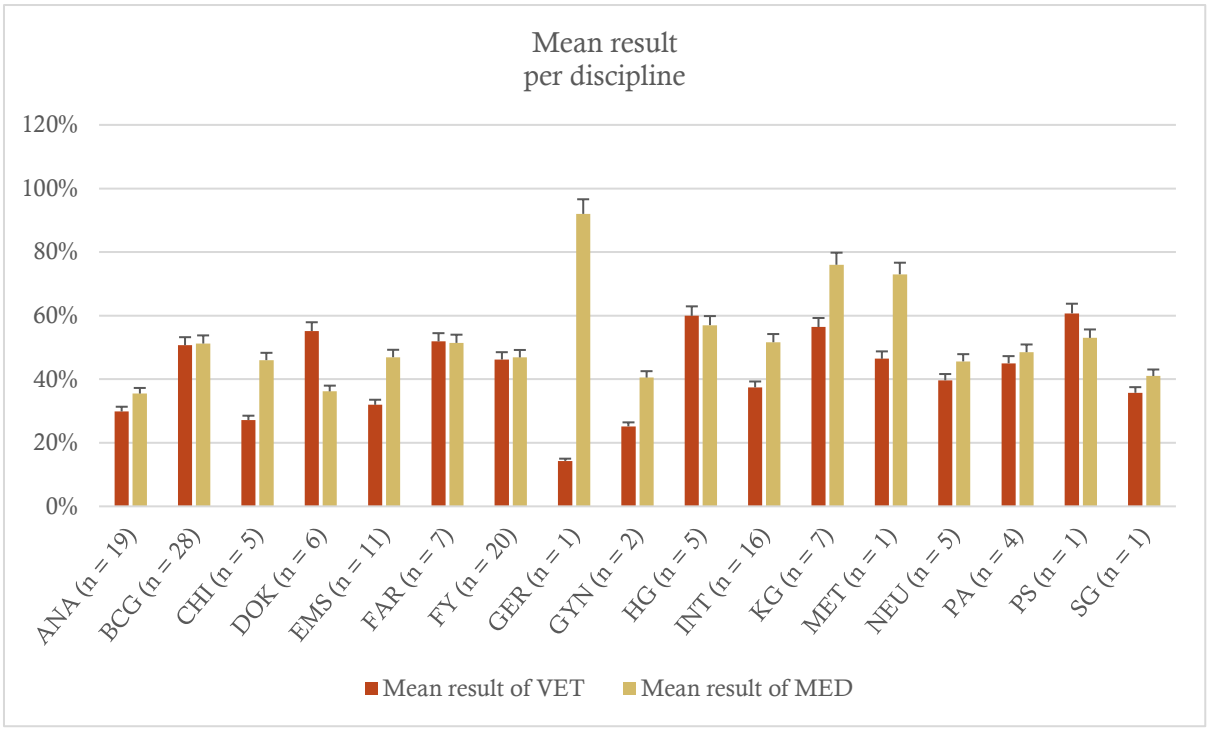

Figure 5 Mean results of VET (veterinary students) and of MED (medical students) per discipline, after correction of relevance = 1.

Figure 6 shows the mean VET and MED scores per category. Between categories no significant differences were found in the VET and MED scores, as showed in the statistics in table 2 ($p > 0.05$).

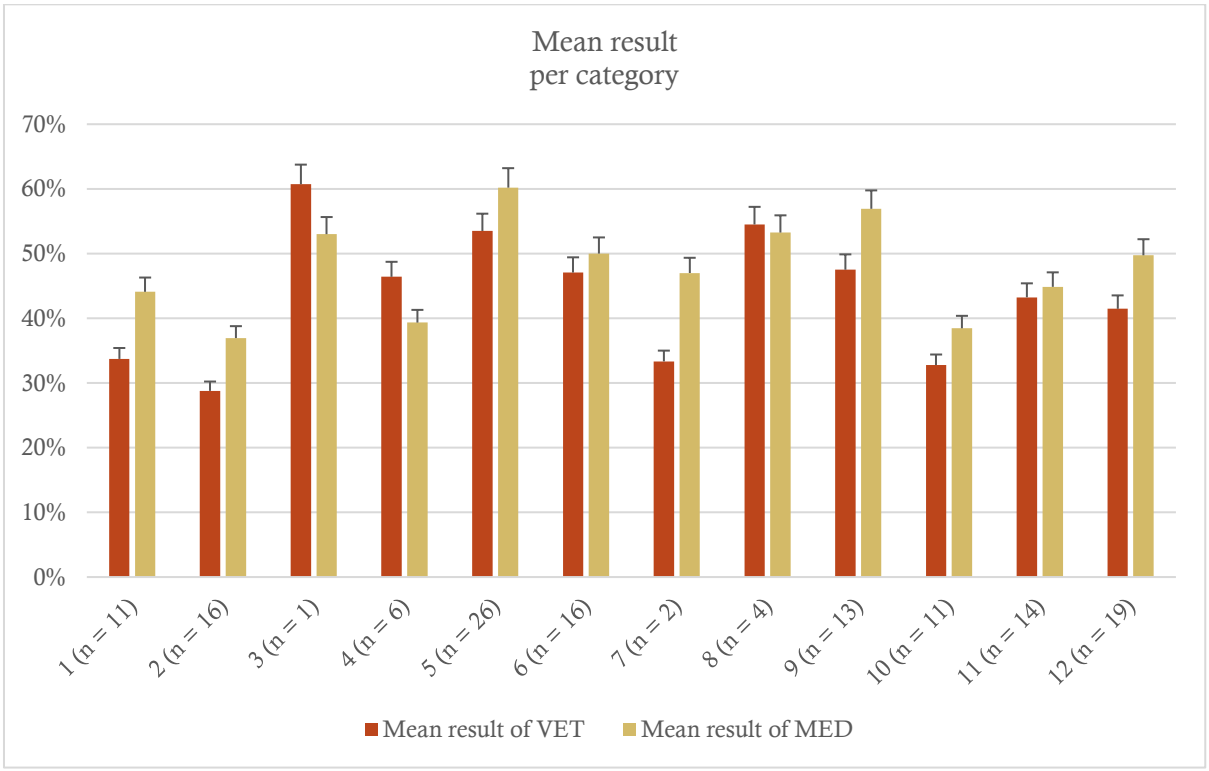

Figure 6 Mean results of VET (veterinary students) and of MED (medical students) per category, after correction of relevance = 1.

Evaluation of students

After the assessments, students filled out a questionnaire to evaluate their experience and opinion about the iVTG September 2015 and about the iVTG May 2016. The reply on difficulty of the iVTG September 2015 was 4 to 5 out of 5, with a mean of 4,25. The iVTG May 2016 has a reply of 3 to 5 out of 5, with a mean of 4,17. The possible explanation could be the fact that the students are disappointed about their result, because of the amount of medical questions. Student gave more weight to this assumption by their answer on the question 'What percentage of the amount of questions are veterinary relevant?'. The answer varied between 2 to 40% with a mean of 20% on the iVTG September 2015 and between 5 to 65% with a mean of 30% on the iVTG May 2016. The seven persons involved in veterinary education scored a mean of 42% in the iVTG September 2015 and a mean of 46% in the iVTG May 2016.

To conclude, students confirmed the assumption of the need of a progress test in the veterinary curriculum, when the questions in this test are at least specified on the veterinary program outcomes.

Discussion

The results from this study about the use of the iVTG in the veterinary curriculum in The Netherlands reveal that this medical progress test could partially also be an appropriate veterinary progress test.

First, third-year veterinary students (VET) scored differently on the overall iVTG and on different disciplines and categories of the iVTG than their third-year medical counterpart students (MED). This result provided insight in the level of similarity between their knowledge and competences. As expected, VET scored lower on the overall iVTG and on categories of the iVTG when compared to MED, but do have the same or even better score on specific disciplines of the iVTG. No other studies described a comparison between veterinary and medical students on a medical PT, but experiences with medical faculties and with a dental faculty exist[2, 4, 9, 28].

Second, based on a significant similarity in scores between VET and MED, the questions which are scored to relevance category 1 could be used as a question databank for a veterinary PT. Especially some disciplines can be used, like ANA, BCG, EMS and FY, as was expected. To assess the best questions for this databank, multiple experts have to perform this relevance scoring. Establishing a more structural scoring system might reduce the subjective aspect.

Third, the participating students perceived progress testing in the veterinary curriculum as relevant. A former study has shown the same result, even though in this result the students already started their Master of Veterinary Science[8].

A limitation of the study might be the amount of results. The number of participating veterinary students on the iVTG (September 2015) was 28 in 2016 and 27 in 2017, which was just a fraction of the whole third-year cohort (225). The low number of students could be explained by the voluntary basis, the non-habituation to the iVTG and the logistic difficulties. The medical students' results differ in faculty and also in measure point. Results on PTs are subject to random fluctuation and thus data from many future student cohorts might be required for more meaningful inter-institutional comparisons[9, 13].

The veterinary students were approached in the same way as medical students are approached when taking the progress test. Differences were the conditioning of medical students in taking a PT, the standard implementation of and experience with the iVTG in the medical curriculum and the analogy of the tested knowledge with the program outcomes of the medical curriculum. In the medical curricula, the habituation to PT took some time, but after this period, students would take the assessment in a relaxed way, which fits the non-threatened student-centred philosophy of problem-based learning[19, 29].

The use of a 'don't know' option is common in PT and is called formula scoring (FS). FS is used to create a possibility to the students showing their knowledge deficit, but is new for the current veterinary students and could influence the test results because of the described risk-taking tendency. Participant who easily take risks may expect that their partial knowledge will less frequent choose for the 'don't know' option, while more careful participant may be more inclined to do the opposite. Guessing on the right answer is more likely when students do not feel the urge to pass the test, which was the case in this voluntary taken assessment for VET[16, 21, 30].

The medical and veterinary Bachelor are compared to each other, but the build-up of the curriculum is different. Although these differences influenced the results of VET on the test, both VET and MED are preparing for a clinical Master, so the 'basic information' should be in both pre-clinical Bachelors. Even though with highly comparable curricula, single-point benchmarking can result in distortion of results. If longitudinal data are available, the information contained in a school's cumulative deviations from the overall mean can be used. This mean test score across schools is a useful benchmark for cross-institutional comparison[17, 18, 25].

To assess the development on functional knowledge or competence, a more longitudinal approach based on equivalent assessments given at fixed intervals is necessary[11]. At least three tests a year would be sufficient, according to the evaluation of a progress test during the 3-year master's phase[8, 22]. The iVTG fits perfectly in this approach and the longitudinal testing in the veterinary curriculum could be an interesting pilot in further research, as is done in other medical schools[7, 10]. Hereby, improvement of the structure by a systemic framework, including a review committee, and a system to give the participants feedback, is strongly recommended[15, 30].

To conclude, the iVTG could partially be an appropriate addition to the veterinary curriculum. A more intensive collaboration with the iVTG committee with allowed use of their question databank will be the next step for developing a veterinary progress test.

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