

# Administration of a Canadian critical appraisal exam to pharmacy students in the Middle East

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## Abstract

**Introduction/Context:** Critical appraisal training of pharmacy students is important in the development of knowledge and skills necessary for the application of evidence-based practice post-licensure. The objectives of this study were to evaluate critical appraisal skills of students in Qatar and to compare performance across applicable academic years.

**Description of Assessment:** Pharmacy students in third year, fourth year, and Doctor of Pharmacy students at Qatar University completed an application-based critical appraisal exam developed by faculty from a Canadian University. Results were categorised according to Bloom's taxonomy and compared by academic year.

**Evaluation:** The median score of students was 30.5%. Students performed best on questions categorised as comprehension and lowest on evaluation questions. A significant improvement in performance as students progressed through the curriculum was observed.

**Implementation and Future Plans:** Findings will be used to refine the current critical appraisal course series to increase emphasis on application of critical appraisal skills.

**Keywords:** *Critical Appraisal, Pharmacy Students, Evidence-Based Medicine*

## Introduction

Knowledge and skills in critical appraisal are necessary for application of evidence-based information in practice (Dawes *et al.*, 2005). To ensure application of evidence-based practice (EBP), critical appraisal training is required. Internationally, health professionals generally report a positive attitude towards EBP and recognise its value (Al-Ansary *et al.*, 2002; Burkiewicz *et al.*, 2005; Peterson *et al.*, 2009; Barghouti *et al.*, 2009; Al-Kubaisi *et al.*, 2010) however varying levels of knowledge about principles have been reported (Al-Ansary *et al.*, 2002; Peterson *et al.*, 2009; Barghouti *et al.*, 2009; Risahmawati *et al.*, 2011).

Providing training in critical appraisal and knowledge translation to ensure healthcare providers are capable of evaluating quality of evidence and using knowledge to improve patient care may facilitate the application of EBP skills in decision-making (Burkiewicz *et al.*, 2005; Horsley *et al.*, 2011; Bookstaver *et al.*, 2011; Neill *et al.*, 2011; Odiema *et al.*, 2012). To prepare students for practice, EBP principles should be taught in the undergraduate curriculum and is required by the Canadian Council for Accreditation of Pharmacy Programs (CCAPP).

The Qatar University (QU) College of Pharmacy (CPH) is accredited by CCAPP (Canadian Council for Accreditation of Pharmacy Programs, 2015). All QU programmes are expected to seek accreditation from a

suitable organisation (such as CCAPP) to support implementation of internationally recognised standards. A critical appraisal series, called "Pharmacy research, evaluation, and presentation skills (PREP)" are mandatory courses offered in 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> year of the curriculum. Students who complete the Doctor of Pharmacy (PharmD) degree are required to enrol in advanced PREP courses.

In order to support improvement in the programme, QU CPH is interested in comparing competencies of students across academic years to ensure progression and to complete benchmarking with other Canadian accredited pharmacy programmes. Students from Dalhousie University in Halifax, Canada are an ideal cohort for comparison as the programme is CCAPP accredited and offers a well-established bachelor's degree in pharmacy including several integrated courses in critical appraisal and knowledge translation. Similar to the QU PREP series, the Dalhousie critical appraisal series runs longitudinally throughout the curriculum and provides comparable content through didactic lectures and interactive journal clubs however, unlike the PREP series content is integrated into therapeutics courses taught through problem-based learning.

The objectives of this study were to evaluate critical appraisal skills of pharmacy students in Qatar and to compare performance across applicable academic years.

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**Description of Assessment**

Research involving normal educational practices at QU is exempt from full review and as such ethical approval was granted for our study by the institutional review board. Undergraduate third year, fourth year, and Pharm.D. students at QU completed a two-hour written exam accounting for 5-10% of course grades, in December 2012 as part of the PREP series. The exam was developed using questions provided by collaborating faculty from Dalhousie University. In order to reflect content covered in the domestic PREP series courses, QU faculty approved questions.

To match conditions in Canada, the exam was open book and consisted of short answer and multiple-choice questions. Approximately half of the exam content evaluated understanding, interpretation, and application of a published meta-analysis made available to students three days in advance of the exam. An exam answer key was developed by the collaborating faculty from Dalhousie University and approved by all investigators.

**Statistical Evaluation:**

Results were summarised descriptively. Questions were independently categorised then jointly discussed using Bloom’s taxonomy by two study investigators (EB and KW) (Anderson *et al.*, 2001). In the event that consensus could not be achieved, a third investigator (DG) was available to provide a recommendation. Categories included: i) knowledge; ii) comprehension; 3) application; 4) analysis; 5) synthesis; and 6) evaluation. Non-parametric testing was used to compare overall exam scores and exam scores by academic years.

**Evaluation**

All fifty students enrolled in third year (n=23), fourth year (n=20), and Pharm.D. (n=7) completed the exam. The median score was 30.5%. An improvement across all academic years ( $p=0.001$ ) and between academic years (Table I) was observed.

**Table I: Student performance by academic year**

Academic Year	Median % (+/- IQR)	Comparison	P-value
Third year	25.2 (+/- 11.4)	Third year vs • Fourth year • Pharm.D.	0.20 <0.001
Fourth year	33.6 (+/- 16.1)		
Pharm.D.	42.9 (+/- 16.7)	Fourth year vs • Pharm.D.	0.036

\*IQR = interquartile

The highest performing category was comprehension and the lowest was evaluation (TableII). Student grades significantly improved by academic year for knowledge, comprehension and evaluation categories. While scores numerically increased in the domains of application and analysis, no statistically significant improvement was seen.

**Table II: Student performance by domain**

	Third year (median +/- IQR)	Fourth year (median +/- IQR)	Pharm.D. students (median +/- IQR)	P-value
Knowledge	29.4 +/- 23.5	35.3 +/- 22.1	58.8 +/- 17.6	0.000
Comprehension	50.0 +/- 18.7	50.0 +/- 18.6	62.5 +/- 9.4	0.018
Application	17.9 +/- 32.3	23.2 +/- 25.9	35.7 +/- 46.5	0.276
Analysis	27.3 +/- 27.3	45.5 +/- 58.6	63.6 +/- 54.5	0.227
Synthesis	18.2 +/- 27.3	43.2 +/- 27.2	27.3 +/- 36.3	0.016
Evaluation	10.0 +/- 10.0	18.7 +/- 19.1	25.0 +/- 15.0	0.002

\*Distribution of percent compared using Kruskal-Wallis Test

**Implementation and Future Plans**

As a Canadian accredited programme, we expected students to score a minimum grade of 60%. Overall, students performed below expectations on this application-based exam. Improvement was noted as students progressed through the curriculum, likely due to completion of advanced level PREP series courses. Although students at this Middle East University performed poorly, results are consistent with a cohort of American pharmacy students who were compared to Canadian pharmacy students using the same exam format with similar content. Students at Dalhousie University in Canada had a mean grade of 67.9% as compared to students at Western University of Health Sciences in the United States who had a mean score of 32.2% (Gardner, 2009).

Poor performance on this exam was likely multifactorial. Historically, critical appraisal at QU was taught primarily through a combination of didactic lectures, presentations, and journal clubs with little application of critical appraisal within therapeutics courses. Performance may have also suffered due to lack of motivation as the exam contribution to the final grade was only 5-10% and was delivered at the end of semester when attention may have been focused on other assessments. Finally, the exam was developed by faculty from Dalhousie University based on content and integration of critical appraisal in their curriculum and as a result, may not have been entirely reflective of the courses offered in Qatar.

Following the compilation of exam outcomes, a curriculum review was conducted. Results were disseminated and feedback sought from PREP series faculty. Lecture and assignment objectives and content were reviewed for each academic year to identify opportunities to augment content and minimise overlapping material. Recommendations for action included: 1) strengthening topic coverage where the exam identified deficiencies; 2) incorporating additional course exercises for student practice and concept reinforcement; and 3) increasing assessment strategies related to analysis and application skills. In addition, faculty agreed to increase integration of critical appraisal into other courses.

This exam will serve as a benchmark as the curriculum enhances focus on EBP. To assess success of implemented strategies, a comparison of third year students at QU to those in Canada will take place after implementation of changes. Result will be shared with faculty at both Universities for further curriculum refinements.

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