Using the Delphi Technique to Determine Objectives and Topical Outline for a Pharmaceutical Care Course: An Experience from the Cuban Higher Education System

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Research article

Keywords: Curricular development, Delphi technique, Pharmacy education, Pharmaceutical Care

DOI: https://doi.org/10.21203/rs.3.rs-35397/v1

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Abstract

Background: How implement pharmaceutical care in pharmacy curriculum remains a recurring question at the pharmacy education setting. The purpose was to define course objectives and topic outline for a pharmaceutical care course in a pharmacy curriculum.

Methods: A two-round modified Delphi process was used to obtain opinions from assessment experts on the objectives and topic outline for a pharmaceutical care course in a pharmacy curriculum. Pharmacy Professors from Cuban, European, Latin American and North American universities were invited to participate in the study. A number of 15 experts was considered. Issues addressed included: about the theoretical program foundation; recommended for teaching literature; instructional and educational objectives of the programme; teaching methods; knowledge, skills and professional values considered; and students performance assessment.

Results: Responses were received from 15 panel experts. The experts made recommendations regarding the relation between the topic and objectives, and referred to the literature, suggesting that texts in the Spanish language should be included in the program. Consensus was achieved for 100% of the proposed items. The final list was composed of 10 objectives for three subjects. The added items included a basic text in Spanish and some papers published in this language were considered as part of the complementary bibliography. The design objectives were updated to ensure that they correspondent to the topics designed for each course. Suggestions related to the relationship between objectives and topics were identified.

Conclusion: The process identified a consensus for course objectives and topics for a pharmaceutical care course. The Delphi method can be an effective means for the definition and validation of objectives and topics outline to implement pharmaceutical care in a pharmacy curriculum.

Background

Since the concept of Pharmaceutical Care was announced from United States, this move has become an influential procedure of practice for many pharmacists around the world. Pharmaceutical care is a professional practice that has arisen to meet the social need to prevent, identify, and solve drug therapy problems (DTP) and, therefore, reduce drug-related morbimortality. DTP is any unwanted incident related to medication therapy that actually or potentially affects the desired goals of treatment. DTP is an important public health problem and has been heightened in recent years. Relatively 28% of all emergency department visits and 5 to 10% of all hospital admissions are drug related. The estimated annual cost of drug-related morbidity and mortality resulting from nonoptimized medication therapy for the United States of America was $528.4 billion, equivalent to 16% of total US health care expenditures in 2016. Thus, DTPs represent a great challenge in the healthcare system as a result of increased patient morbidity, mortality, and healthcare costs. In this stage, pharmaceutical care emerges as a patient-centered practice, in which the pharmacist assumes responsibility for the patients’ pharmacotherapeutic problem solvability and medication management.
needs and collaborates with other members of the health-care team, becoming then co-responsible for
the outcomes of his/her pharmacotherapy. According to, pharmacy education around the world is
witnessing a process of transformation leading to perform pharmacists capable to provide
pharmaceutical care. Profound curricular changes have been occurred in countries like Australia,
Chile and United State of America, developing a patient centered care professional practice. But, even
today, pharmacy education continuous to be a barrier to implementation and developing of
pharmaceutical care. As long as, how implement the pharmaceutical care in a pharmacy curriculum is
a question without answer in some countries around the world. In addition, pharmacy students have
difficulties with the practice of pharmaceutical care, despite having extensive knowledge about various
medicines, especially in developing countries.

According to Storpirtis, this change in focus also implies that the pharmacy curriculum should be
adapted, in order to provide pharmacists with new knowledge and skills. In most countries this change is
taking place but not in a very structured manner. Fresco and Silva described an example of
pharmaceutical care teaching experience showing a description of a course syllabus, methods and
teaching evaluation tools employed that demonstrated to motivate students toward this new practice and
prepare them increasing their practical skills and clinical competences. Furthermore, Fernández-Llimos
and Nunes da Cunha designed a coding tree to classify pharmacy practice teaching topic, they included
110 pharmacy schools with 1703 pharmacy practice syllabus related to pharmacy practice area,
nonetheless, according to the authors, other studies are necessary to note the teaching of these curricular
topics.

Recently, Arason et al., refer this type of learning more challenging than just learning content to repeat
or apply at a later time. It is necessary to personalize this learning and make the practice of
pharmaceutical care “real” for students. How do we facilitate the incorporation of Pharmaceutical Care
and Pharmacists’ Patient Care Process (PPCP) into our students’ professional identity development was
a question stated by the same author, and the proposal method is to introduce the PPCP early in the
curriculum and link it to aspects of the profession students are familiar with, similarly, this approach was
described by Martinez-Sanchez in 2009.

In 2005, the Cuban government adopted inventiveness to inspire pharmacists to apply this new
professional practice, including pharmaceutical care in the Cuban pharmacy legislation. Included were
recommendations for didactic and assessment chances concerning incorporation of pharmaceutical care
into the pharmacy curriculum, and the foundation for this emerging area of curriculum. In 2017, the
Cuban Council on Higher Education stated a new curriculum named “E”, consistent with, pharmaceutical
care is considered as an eligible topic into the framework of an own obligatory basic curriculum
according to the necessities related to the social and geographical context university. Nevertheless,
limited published guidance is available on curricular structures, determining curricular objectives, topics
and skills for pharmaceutical care in the Cuban pharmacy education system.
The Delphi technique has been applied widely in diverse areas of scientific research.\textsuperscript{20} Similarly, Delphi studies have been valuable in educational settings in forming procedures, standards, and in predicting tendencies.\textsuperscript{21} The Delphi Technique is a method designed to attain consensus of ideas of a group of experts (via) a series of intensive surveys interspersed with controlled belief feedback.\textsuperscript{22} Many studies support its to develop and inform curriculum, thus, this technique have been found useful in curriculum development in business, nursing, medicine, agriculture, and technology along with environmental education.\textsuperscript{23} In addition, numerous studies endorse the use of Delphi technique in pharmacy curriculum foundation. Corvvey and Ryam\textsuperscript{24} identified a consensus for course objectives for a model global health education course in a pharmacy curriculum using a modified Delphi process. A study by Finn \textit{et al.}\textsuperscript{25} used a Delphi panel to develop anatomy teaching within an integrated curriculum as per requirements of the General Pharmaceutical Council (GPhC). Besides, these authors described the advantage of using a Delphi approach in curriculum foundation. Also, Koehler and Bok provided a solid foundation for Pharmacy Technicians training and curriculum development based on several rounds of scientific research. According to, these authors determined the competency framework may help understand the Pharmacy Technicians role and how to best prepare them for practice within pharmaceutical care.\textsuperscript{26} 

The purpose of this study was to define course objectives and topic outline for a pharmaceutical care course in a pharmacy curriculum achieved through the use of a Delphi process among stakeholders in pharmacy education and pharmaceutical care practice. These objectives and topics will be useful to pharmacy teachers in curricular design process for implement pharmaceutical care philosophy in their current teaching.

**Methods**

This work was designed to obtain feedback from a group of teachers and pharmacists practitioner involved in pharmaceutical care and patient care related to objectives and main topics that could be considered as possible references to implement pharmaceutical care in a basic pharmacy curriculum. A two-round modified Delphi process was used to obtain opinions from assessment experts on the objectives and topic outline for a pharmaceutical care course in a pharmacy curriculum. The Delphi method is a consensus-based technique that offers a systematic method of collecting and aggregating informed judgments from a group of experts via several iterations. Controlled feedback from successive rounds encourages participants to reassess, alter and/or develop opinions.\textsuperscript{27} The Delphi process depend on the identification and use of specialists within the subject area. Delphi process does not require a random sample and that the qualities of the panel members are more significant than the number of persons on the panel.\textsuperscript{28} For the current study, international experts were invited to attend the panel according to study’s inclusion criteria selected for engaged specialists representing clinical pharmacy or pharmaceutical care teachers. Although there is no a consensus regarding the ideal number of specialists needed for a Delphi panel, in this study, a number of 15 experts was considered in line with Delbecq and colleagues.\textsuperscript{28} Other author have been considered a smaller number.\textsuperscript{29}
According to Aronson and colleagues, there is a large number of definitions for the desired level of consensus in a Delphi process, but there is not a definitive agreement. The meaning of consensus selected for the present study was considered to exist if the interquartile range of the participants’ responses fell within any three-point range; “disagreement” existed if the interquartile range spanned both the 1–3 range and the 7–9 range. If neither consensus nor disagreement existed, “partial agreement” was considered to have occurred. Where consensus existed, it was considered that the item would be restructured if the median score fell within the 7–9 range, that it should be excluded if it fell within the 1–3 range, and that it was equivocal if it fell within the 4–6 range. If the consensus was that the item was equivocal, or if consensus was not obtained at the end of the second stage, the participants’ additional comments, together with their scores, were used to decide whether or not to classify each item adequate.

This study was approved by the Cuban Ministry of Science, Technology and Environment. Moreover, it was supported by the “Manuel F. Gran” Center for the Study of Higher Education at the University of Oriente in Santiago de Cuba, Cuba. Pharmacy Professors from the University of Minnesota-College of Pharmacy classes (United State of America); the University of Valparaíso (Chile); the Cardenal Herrera University (Spain), the University of Havana (Cuba); the University of Florida (United State of America); the University of Manchester (UK); and the University of Oriente (Cuba) were invited to participate in the study as “engagement experts” if they met this 2 criteria: (1) enrollment in the clinical pharmacy and/or pharmaceutical care area at the university, and (2) to be qualified as a PharmD., persons who met these conditions were those who had taken on added curricular or extracurricular tasks, shown academic distinction in their acceptance into an academic honor society, and proved leadership amongst their colleagues. An email was sent inviting their participation in the Delphi process and providing information on the study. This resulted in an initial email list of 20 individuals for panel invitation, 15 individuals agreed to do so.

The initial stage of the study involved a compiling of possible objectives and outline topics. A literature search was conducted on three pharmacy education-related journals: the *American Journal of Pharmaceutical Education, Pharmacy Education,* and *Journal of Pharmacy Practice and Education.* All journals were queried using the examination terms “pharmaceutical care”, “pharmacy education” and “curriculum” to categorize potential issues of interest. Furthermore, related books on pharmaceutical care practice and education were studied.

The first instrument consisted of eleven open-ended questions. Issues addressed included: about the theoretical program foundation; recommended for teaching literature; instructional and educational objectives of the programme; teaching methods; knowledge, skills and professional values considered; and students performance assessment.

The questionnaire developed was reviewed by the authors for topic and layout and then piloted with two teachers, and two pharmacists, who were not included in the subsequent study panel. This resulted in the rewording of some items to aid understanding. Before receiving the survey, all individuals were contacted...
by e-mail, fax, or telephone to inform them to expect the survey. Finally, each questionnaire was mailed with a cover letter.

Responses to the questions asked in the first iteration were synthesized and used to develop the second questionnaire. This questionnaire required the same pharmacists “experts” to rate the importance of each issue raised in the first iteration. Only the items or points where consensus was not reached in the first stage were included in this stage. The participants were asked to reconsider their scores having studied the whole panel’s anonymised responses. They were provided with the following: (1) median and interquartile range of the whole panel’s response for each definition or scenario; (2) comments made by individual (anonymous) participants together with the associated score; and (3) their own score relating to an item or definition. The inclusion of the participants’ comments and a summary of their responses increase the number of reasoned responses and decreases the number of rounds required in order to reach consensus.

Participants were asked to indicate their level of agreement with each objective/topic statement using a Likert scale of: very suitable, suitable and unsuitable. For the first two rounds, respondents were given an opportunity to suggest changes to current objectives/topic within each domain for inclusion. All data collected was processed using a frequency analysis method.37

Results

Fifteen respondents (response rate 100%) submitted completed two-round questionnaires. All respondents were involved in pharmacy education 5 at Havana University, 4 at Oriente University, 1 at University of Minnesota (MN), 1 at University of Valparaiso (Chile), 1 at “Cardenal Herrera” University (Spain), 1 at the University of Florida (FL) and the remaining 2 were from the University of Manchester (UK). Of the 15 respondents, 14 were male (93%) and 1 was female (6%). The mean length of time the respondent had been qualified as a pharmacist was 20 years, and the mean length of time the respondents had worked in pharmacy education was 15 years. All experts are Doctor of Pharmacy (PharmD).

Consensus was achieved for 100% of the proposed items to evaluate the pharmaceutical care teaching program design (Table 1). The experts made recommendations regarding the relation between the topic and objectives, and referred to the literature, suggesting that texts in the Spanish language should be included in the program. The added items included a basic text in Spanish and some papers published in this language were considered as part of the complementary bibliography. The design objectives were updated to ensure that they correspondent to the topics designed for each course (Table 2).
Table 1
Values of relative frequencies multiplied by reverse normal curve and cut point calculated for each assessment category

| Items survey evaluation | Very suitable | Suitable | Unsuitable | Averages | N-P |
|-------------------------|---------------|----------|------------|----------|-----|
| About the theoretic and practical foundation |                |          |            |          |     |
| Relevance in relation to the professional model (Professional Profile) | 0.84          | 3.49     | 3.49       | 2.60     | -0.621 |
| Relationship with the current demands of the pharmacy profession | 3.49          | 3.49     | 3.49       | 3.49     | -1.511 |
| Didactic foundation | -0.23         | 3.49     | 3.49       | 2.25     | -0.271 |
| **Required and optional literature** |               |          |            |          |     |
| Relevance | 1.48          | 3.49     | 3.49       | 2.82     | -0.841 |
| Origin and language diversity | -0.10         | 1.48     | 3.49       | 1.62     | 0.359 |
| Correspondence with the objectives | 1.48          | 3.49     | 3.49       | 2.82     | -0.841 |
| Instructional and educational objectives |                |          |            |          |     |
| Clear and precise desing | 3.49          | 3.49     | 3.49       | 3.49     | -1.511 |

Decision Rule: If N-P < Cutting point, then answer is accepted as valid within the appropriate category.

N: Limit value. The average values of the points of cut, which are not more than the averages of each category (column), so that averages the average.

P: Average value of each row.
| Items survey evaluation                      | Very suitable | Suitable | Unsuitable | Averages | N-P   |
|---------------------------------------------|---------------|----------|------------|----------|-------|
| Measurable                                  | 1.48          | 3.49     | 3.49       | 2.82     | -0.841|
| **Course structure**                        |               |          |            |          |       |
| Correspondence with the objectives          | 0.25          | 3.49     | 3.49       | 2.41     | -0.431|
| Feasibility of practical activities         | -1.13         | 3.49     | 3.49       | 1.95     | 0.029 |
| Sequence                                    | -0.43         | 3.49     | 3.49       | 2.18     | -0.201|
| Distribution and balance of schedule        | -1.55         | 3.49     | 3.49       | 1.81     | 0.169 |
| **Content**                                 |               |          |            |          |       |
| Relevance                                   | 3.49          | 3.49     | 3.49       | 3.49     | -1.511|
| Correspondence with the objectives          | 3.49          | 3.49     | 3.49       | 3.49     | -1.511|
| Systematicity                               | 0.62          | 3.49     | 3.49       | 2.53     | -0.551|
| **Teaching methods**                        |               |          |            |          |       |
| Student responsibility for education        | 0.84          | 3.49     | 3.49       | 2.60     | -0.621|
| Problem basic approach                      | 0.25          | 3.49     | 3.49       | 2.41     | -0.431|
| **Evaluation**                              |               |          |            |          |       |
| Assess application to practice              | 1.11          | 3.49     | 3.49       | 2.69     | -0.711|
| Cut points                                  | 1.048         | 3.378    | 3.49       |          |       |

Decision Rule: If N-P < Cutting point, then answer is accepted as valid within the appropriate category.

N: Limit value. The average values of the points of cut, which are not more than the averages of each category (column), so that averages the average.

P: Average value of each row.
### Table 2
Description of the subjects in terms of their objectives, knowledge and didactic methods

| Subjects                          | Objectives                                                                 | Knowledge                                                                 | Didactic method                                                                 |
|----------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Integrated Pharmaceutical Care I | Students will be able to:                                                 | Pharmaceutical Care - Introduction & Impact                              | Lectures, Critically review all recommended readings, Case Study Seminars, written assignments, examinations |
|                                  | - Design individualized, culturally and clinically appropriate care plans | Care planning: a component of the patient care process                    |                                                                                |
|                                  | - Interviewing a patient                                                  | Drug Therapy Problems                                                    |                                                                                |
|                                  | - Completing a health history                                             | Subjective and Objective Information                                     |                                                                                |
|                                  | - Completing a drug utilization                                           | Care Plan, Follow-up and Evaluations                                    |                                                                                |
|                                  | - Identify drug therapy problems                                          |                                                                          |                                                                                |
| Integrated Pharmaceutical Care II| Students will be able to:                                                 | Levels of pharmaceutical care: factors and risks                         | Lectures, workshop, Critically review all recommended readings, Case Study Seminars. Written assignments, examinations |
|                                  | - Implement therapeutic plan                                              | Pharmaceutical interventions more common in clinical practice             |                                                                                |
|                                  | - Advise patients about drug choices and other treatment options          |                                                                          |                                                                                |
|                                  | - Address patient concerns / resistance / ambivalence and cultural consideration |                                                                          |                                                                                |
|                                  | - Document pharmaceutical care activities for ongoing patient care, quality control, quality assurance, and accountability |                                                                          |                                                                                |
| Integrated Pharmaceutical Care III| Students will be able to:                                                | Tools for assessing the quality of care provided. Evaluation of pharmaceutical care process: model structure - process - outcome. Methods to assess quality of life. | Workshop, clinical case presentations, oral clinical presentations, written assignments, examinations |
|                                  | - Integrate their knowledge, skills, and personal caring into the provision and process of pharmaceutical care |                                                                          |                                                                                |
At the same time, inclusion of pharmaceutical care in pharmacy curriculum is a pharmacy educational reform action. According to Díaz-Barriga\textsuperscript{38} the fundamental problem of the curriculum reform process is that when such a process does not provide adequate preparation of teachers, mainly in terms of really understanding the reason for the changes, the project fails to materialize, or does not achieve the desired depth. Teachers have always had an innate sense of this role, but curriculums should have an operational model and evaluation techniques. Without these, teachers cannot specify how pharmacy students must perform in their practice as we see the profession today. Thus, this study employed an iterative process to validate the necessary curriculum framework, and all curriculum design elements of a pharmaceutical care teaching program.

Using previously established elements of a pharmaceutical care program, experts developed additions, changes, and clarifications that would transform such a program. Through these revisions, consensus was reached on how to form program design elements. The revised items reflect the differences between pharmacy curriculum designs to implement pharmaceutical care in the curriculum, as recognized by experts. Consensus for program foundations was achieved. Besides, suggestions related to the relationship between objectives and topics were identified.

**Discussion**

Based on the comments received in the first-round Delphi survey, changes were made to the criteria included in the second round. These additions reflect the slightly different nature of professional engagement compared with work engagement. This consistency suggests that the experts examined both their curricular design knowledge and pharmaceutical care practice experience and proposed changes based on characteristics that they had experienced. Some of the suggested additions reflect the characteristics of the experts’ context development. These include a Spanish bibliography inclusion; a possible explanation is that most of the experts are Spanish-speaking and develop their academic and professional in this language, which has an ethical and cultural explanation to prioritize the development of education in the native language of the students. Nevertheless, literature in English is held in correspondence with the so-named English Language Master Plans of the Cuban Higher Education, which ensures consistency in training skills in this language throughout the curriculum.\textsuperscript{39}

Recommendations related to the relationship between objectives and topics are consistent with the diversity of practical experience in pharmaceutical care experts, given the existence of different paradigms or schools of pharmaceutical care practice, namely: Dader Method\textsuperscript{40} and the Minnesota model.\textsuperscript{41} These finding are consistent with trends on the future of graduate education in the Pharmaceutical Sciences around the world. According to the American Association of College of Pharmacy's (AACP) Commission to Implement Change in Pharmaceutical Education, the mission of pharmaceutical education is to provide a curriculum, which by its topic and presentation, enables the student to learn the knowledge, skills, and values necessary to meet the drug-related needs of patients in society.\textsuperscript{42–44}
Concurrently, these findings validate the usefulness of the logic of the profession as a teaching tool that allows translation of the modes of action professionals in curriculum design, allowing for consistency among the definition of topics, skills and professional values that make up the curriculum.45

The importance of design is highlighted when examining the consensus status of different activities. In the clinical setting, both traditional learning and problem-based learning are both components of curriculum requirements that take place outside of the classroom. Consensus was achieved for teaching methods which are based on patient-centered care. These results reflect the strength of the opinions of experts and are consistent with the ideas stated by Barrows.46 Many important clinical skills will not be effectively learned in lecture; the intellectual skills involved in clinical reasoning (problem-solving) will best be acquired through a problem-based approach that emphasizes not only what knowledge is acquired, but also how it is acquired. This study is limited in scope. It asks and answers fundamental questions required to define and validate curriculum design elements contained in a Pharmaceutical Care teaching program. Although defining and describing these elements were necessary steps toward developing a theoretical model to implement pharmaceutical care in pharmacy curriculum, additional questions remain and will need to be undertaken with future research. The inclusion criteria were another limitation of this study. Although they aimed to gather a group of individuals who were pharmacy education experts, our need for objective criteria that was available in accessible records may have resulted in the exclusion of individuals who had significant experience with pharmacy teaching.

There are limitations to this study to consider. One limitation in reporting the process for the Pharmaceutical Care Teaching Programme is the lack of demographic data on the respondents. The major reason for this lack of segregation is that the collective, broad-base response of experts in pharmacy education was sought.

Conclusion

This study created an academic pharmacy experts consensus definition of pharmaceutical care teaching program elements, identified from a pedagogic model which takes into consideration this philosophy and introduces an essential logic of the profession as a didactic tool that allows us to translate this professional model into the pharmacy curriculum, and generated suggestions that lead to validate the curriculum program design. The Delphi method can be an effective means of qualitative evaluation for the definition and validation of objectives, topics, teaching methods and literature recommended to implement pharmaceutical care in pharmacy curriculum.

Lastly, this work represents an approach to find a pedagogical model to conduct the pharmaceutical care implementation process in the pharmacy curriculum. These findings should be further validated with additional teaching practice. Further research is also needed to measure levels of competence achieved by students, the level of satisfaction with the results achieved by students and teachers, as well as the impact of this new teaching in clinical practice.
List Of Abbreviations

Drug therapy problems (DTP)

Pharmaceutical Care and Pharmacist's Patient Care Process (PPCP)

General Pharmaceutical Council (GPhC)

American Association of College of Pharmacy's (AACP)

Declarations

Ethics approval and consent to participate:

This study was approved by the Cuban Ministry of Science, Technology and Environment. Moreover, it was academically supported by the “Manuel F. Gran” Center for the Study of Higher Education at the University of Oriente in Santiago de Cuba, Cuba. According to, a written consent was carried out, where participants were invited, and those who agreed to be part of the study received a text of the questionnaire. All data remained confidential and anonymous, as there were neither names nor identifiers on the forms.

Consent for publication:

Not applicable (no individual person's data or data from persons). This is part of the doctoral thesis author

Availability of data and materials:

Competing interests:

Not applicable (No competing interests)

Funding:

Not applicable

Authors' contributions:

the author was a major and single contributor in writing the manuscript.
Acknowledgements:

The author would like to acknowledge the “Manuel F Gran” Center for the Study of Higher Education at the University of Oriente in Santiago of Cuba (Cuba) for funding the research and also to thank all the respondents who participated in the survey.

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