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MONIQUE OLIVEIRA JABBUR LOPES

# ELABORAÇÃO E IMPLEMENTAÇÃO DA FERRAMENTA DO PACIENTE VIRTUAL NO ENSINO DA ATENÇÃO FARMACÊUTICA

ARACAJU

2011

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Aprovada em:__/__/__

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Orientador: Prof.Dr. Divaldo Pereira de Lyra Júnior

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Examinador 1: Prof.Dr. Wellington Barros da Silva

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Examinador 2: Prof.Dr. Alexandre Sherlley Casimiro Onofre

PARECER

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# RESUMO

Elaboração e implementação da ferramenta do paciente virtual no ensino da Atenção Farmacêutica

**Introdução:** Nos últimos anos, alguns cursos de Farmácia do mundo tem utilizado novas técnicas para o ensino da Atenção Farmacêutica, como: pacientes simulados, pacientes virtuais, análise de fitas de vídeo e observação direta. De acordo com a literatura, o uso de pacientes virtuais permite aos estudantes aprimorar suas competências no cuidado a pacientes. No Brasil, não há softwares educativos na formação acadêmica e profissional da Atenção Farmacêutica, o que evidencia a necessidade de desenvolver ferramentas como o paciente virtual (PV). **Objetivo:** Elaborar e avaliar o software Pharma-PV no ensino de competências para a prática da Atenção Farmacêutica dos estudantes de Farmácia. **Métodos:** Inicialmente, foi realizada uma revisão sistemática a partir da busca nos bancos de dados eletrônicos: EBSCO, Embase, LILACS, Medline, PubMed, Scielo e Scopus de artigos publicados até 2009. Para tanto, foram utilizadas as palavras-chaves: "virtual patient" e "pharmacist", "virtual patient" e "pharmacist", "virtual patient" e "medication". Em seguida, foi desenvolvido o software do Pharma-PV e aplicado na disciplina de Atenção Farmacêutica do último ano do Curso de Farmácia da Universidade Federal de Sergipe. A versão final do software ficou disponível por meio do link "www.pharmavp.ufs.br". No programa foram cadastrados vários casos clínicos de paciente virtuais, usando campos definidos. No Pharma-PV os estudantes realizaram análise do caso clínico, documentação, estabelecimento das intervenções e planos de cuidados. **Resultados:** Na revisão sistemática, apenas sete artigos atenderam os critérios de inclusão. Quanto a aplicação do Pharma-PV, o mesmo foi testado por 32 estudantes. Durante a resolução dos casos, houve 100% de concordância com o protocolo de documentação e 90% com o protocolo de intervenções e planos de cuidados. O instrumento quanti-qualitativo foi multidimensional e mostrou resultados positivos quanto ao uso do Pharma-PV. **Conclusão:** A revisão sistemática mostrou a escassez de estudos na literatura e ratificou a necessidade de criação softwares educativos para estudantes de Farmácia que possibilitem mimetizar situações reais de cuidado ao paciente. O desenvolvimento e aplicação do Pharma-PV demonstrou que esse estudo é inovador, pois desenvolveu e aplicou um software para o ensino de competências para a prática da Atenção Farmacêutica em língua portuguesa.

# ABSTRACT

Development and implementation of a “virtual” patient program in the teaching of Pharmaceutical Care

Monique Oliveira Jabbur Lopes, Aracaju, 2011

**Introduction:** In recent years, new teaching techniques have been used: simulated patients, virtual patients, analysis of videotapes and direct observation. According to the literature, the use of virtual patients allows students to improve their skills in patient care. In Brazil, there isn’t educational software in academic and professional of the pharmaceutical care, which shows the need to develop tools such as PV. **Objective:** Develop and implement software Pharma-PV in teaching skills for the practice of pharmaceutical care for students of Pharmacy. **Methods:** Initially, was performed a systematic review in the electronic databases: EBSCO, EMBASE, LILACS, MEDLINE, PubMed, Scopus and Scielo articles published until 2009, using “virtual patient” and “pharmacy”, “virtual patient” and “pharmacist”, “virtual patient” and “medication” as keywords. Then we developed the Pharma-PV software and applied in the Pharmaceutical Care Course in the last year of Pharmacy Degree at Federal University of Sergipe. The end version became available through the link "www.pharmavp.ufs.br”. In the program was registered several clinical cases of virtual patient using fields defined. In Pharma-PV, the students analyzed the clinical cases, performed documentation, establishment of interventions and care plans. **Results:** The systematic review, only seven articles met the inclusion criteria. As the implementation of the Pharma-PV, it was tested by 32 students. During resolution of the cases showed 100% concordance with the protocol documentation and 90% with the protocol of interventions and care plans. The instrument was multidimensional quantitative and qualitative and showed positive results regarding the use of Pharma-PV. **Conclusion:** A systematic review showed a lack of studies in literature and confirmed the need for creating educational software for students of Pharmacy enabling mimic real situations of patient care. The development and implementation of Pharma-PV showed that the system is innovative because it has developed and implemented a software for teaching skills for the practice of pharmaceutical care in Portuguese.

# SUMÁRIO

# INTRODUÇÃO

# 1 INTRODUÇÃO

Desde o último século, as inovações tecnológicas na área da saúde, em especial na área farmacêutica, têm contribuído substancialmente para o aumento da expectativa de vida da população (LLIMÓS et al., 2005). Apesar das vantagens indiscutíveis da inovação tecnológica, mais de 50% dos medicamentos são prescritos, dispensados ou utilizados de forma inadequada em todo o mundo (ANTOÑANZAS, 2002; WHO, 2010). Em consequência, o uso irracional de fármacos e medicamentos pode ser considerado fator de risco à saúde, como o tabagismo, obesidade, sedentarismo e consumo de álcool (LLIMÓS; FAUS, 2003).

Baseado nessas informações, o maior acesso aos medicamentos tem aumentado a morbimortalidade relacionada à farmacoterapia e os custos nos sistemas de atenção à saúde (CIPOLLE; STRAND; MORLEY, 2004; SAMOY et al., 2006). Em 2007, os medicamentos foram responsáveis por cerca de 25% das internações hospitalares nos Estados Unidos e o custo anual na prevenção da morbimortalidade relacionada à farmacoterapia nesta população ultrapassou US$ 177 bilhões (CDC, 2009). No Brasil, os medicamentos são os principais causadores de intoxicações desde 1996 (SINITOX, 2007). Dentre as causas desta morbimortalidade destacam-se a comunicação inadequada entre profissionais de saúde, cuidadores e pacientes e a deficiência no conhecimento sobre o manejo da farmacoterapia (PINA, 2006; ASLANI; BENRIMOJ; KRASS, 2006; SILVA et al., 2007).

Neste cenário, a comunicação entre pacientes e farmacêuticos pode ser considerada uma ferramenta essencial nos cuidados à saúde, especialmente na identificação e redução dos problemas relacionados à farmacoterapia (WHO, 1997; BERGER et al., 2005; SHAH; CHEWNING, 2006; LYRA Jr. et al., 2007). No entanto, diversos estudos na literatura corroboram que falhas de comunicação podem levar a problemas relacionados a medicamentos (SANTELL; HICKS; COUSINS, 2005; WAKEFIELD; UDEN-HOLMAN; WAKEFIELD, 2005; SILVA et al., 2007). Além disso, outras pesquisas mostram que a interação adequada dos farmacêuticos com os pacientes pode fornecer competências para melhorar o manejo da farmacoterapia (SHOEMAKER; OLIVEIRA, 2006; OLIVEIRA; BRUMMEL; MILLER, 2010).

Embora a expressão "manejo da farmacoterapia" tenha sido usada pela primeira vez em 2003, os farmacêuticos tem prestado serviços semelhantes, pois o termo "Atenção Farmacêutica" foi introduzido em 1990 (OLIVEIRA; BRUMMEL; MILLER, 2010). A Atenção Farmacêutica é um modelo de prática profissional, criado na década de 1990, no qual o farmacêutico assume a responsabilidade sobre o cuidado das necessidades do paciente em relação ao uso de medicamentos por meio do acompanhamento sistemático, contínuo e documentado da farmacoterapia. O objetivo deste modelo é alcançar resultados terapêuticos definidos na saúde e qualidade de vida da população (HEPLER; STRAND, 1990; ISETTS et al., 2006). De acordo com Tweedie e Jones (2001) o manejo farmacoterapêutico é a provisão sistemática dos medicamentos por meio da parceria entre pacientes e profissionais de saúde, a fim de alcançar melhores resultados e minimizar os custos de atenção à saúde.

Na prática do cuidado farmacêutico, por sua vez, as deficiências das competências (conhecimentos, habilidades e atitudes) sobre como manejar a farmacoterapia e estabelecer relação terapêutica com os pacientes pode levar a problemas relacionados a efetividade, segurança e cumprimento do regime terapêutico (KIMBERLIN, 2006; OLIVEIRA; BRUMMEL; MILLER, 2010). Deste modo, Mobach (2001) ressalata a necessidade de se disponibilizar estratégias educativas que aproximem o farmacêutico do “mundo real”, fornecendo conhecimentos e instrumentos voltados para o cuidado aos pacientes, por meio do ensino da Atenção Farmacêutica e o manejo da farmacoterapia. Ademais, é necessário introduzir técnicas de ensino inovadoras que aproximem o estudante dos diversos cenários da prática profissional, em especial na farmácia comunitária.

Em alguns países, as novas técnicas de ensino mais utilizadas para o cuidado ao paciente são: o uso de pacientes simulados, pacientes virtuais, entrevistas presenciais, por telefone e por e-mails, análise de fitas de vídeo e observação direta (BERGER et al., 2005; VILLAUME; BERGER; BARKER, 2006; MACKELLAR et al., 2007). Segundo Orr (2007), o uso de paciente virtual permite aos estudantes aprimorar suas competências no cuidado a pacientes. Em diversas áreas da saúde, o uso de ferramentas educativas virtuais já vem sendo utilizado desde o final da década de 1990 (SHEROUSE; CHANEY, 1991) e são consideradas um importante instrumento para o desenvolvimento de diversas competências, desde clínicas (TRIOLA et al., 2006) até comportamentais (DELADISMA et al., 2008). Vale ressaltar que

este tipo de aprendizado também é comum em outras áreas da saúde, como enfermagem (EFFKEN et al., 2005) e odontologia (SANDERS et al., 2008), etc.

Em uma revisão sistemática desenvolvida nesta dissertação foram encontrados sete estudos voltados para o desenvolvimento de habilidades e conhecimento na área da Farmácia, com o uso do PV (FUHRMAN et al., 2001; VILLAUME; BERGER; BARKER, 2006; HUSSEIN; KAWAHARA, 2006; ZARY et al., 2006; ORR, 2007; MARRIOT, 2007a; MARRIOT, 2007b). No Brasil, além da falta de investigações na área, não há ferramentas como o PV na formação acadêmica e profissional dos farmacêuticos, o que evidencia a necessidade de desenvolver este tipo de ferramenta.

Diante disso, introduzir e disseminar práticas inovadoras de simulações, por meio virtual, pode potencializar a formação profissional dos farmacêuticos do século XXI, especialmente na otimização nas competências voltadas para Atenção Farmacêutica.

## 1.1 Estrutura da Dissertação

Esta dissertação foi estruturada em duas partes, com uma revisão de literatura e mais um capítulo prático.

Primeiramente, a revisão sistemática apresentou os resultados de um levantamento da literatura na qual foi analisada a qualidade dos artigos que utilizam o PV no ensino da Atenção Farmacêutica. Tal revisão será enviada para revista Patient Education and Counseling no ano de 2011.

O capítulo 1 foi desenvolvido em formato de artigo, seguindo as normas do periódico científico o qual será submetido. Neste capítulo foram apresentados os resultados do desenvolvimento e implementação da ferramenta do paciente virtual no ensino da Atenção Farmacêutica.

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REVISÃO DA LITERATURA

## 2. O PACIENTE VIRTUAL NO ENSINO DA ATENÇÃO FARMACÊUTICA: UMA REVISÃO SISTEMÁTICA

**Article title:** Virtual patient in the teaching of pharmaceutical care: a systematic review
**Manuscript Format:** Patient Education and Counseling Style

Manuscripts should be organized as follows:

**Title page, Abstract, 1. Introduction, 2. Methods, 3. Results, 4. Discussion and Conclusion, References, Legends.**

Keep text, graphics and tables as separate files - do not import the figures and tables into the text file. Tables and Figures should be uploaded as separate table files and separate figure files. Acknowledgments for technical assistance should be indicated on the title page. Financial Support and any conflict of interest should be indicated in the acknowledgments. All articles and reviews must have a structured abstract not exceeding 150-200 words and appropriate keywords. Abstracts should adhere to the following format: **Objective, Methods, Results, Conclusion, Practice Implications.**

Articles must be in electronic format (double-spaced).

The title page should include a concise and **informative title, first name and surname of the first author and his/her institution affiliation address. Please also provide an address, telephone and fax number and e-mail address where the corresponding author can be contacted. For co-authors, mention only first name and surname of their institution affiliation, but no address.**

Footnotes to the text should be avoided.

**Discussion and Conclusion** should be headed as one section and divided into three parts. Example: 4. Discussion and Conclusion, 4.1. Discussion, 4.2. Conclusion, 4.3. Practice Implications.

## Practice Implications

Articles should include a paragraph or paragraphs entitled 'Practice Implications' as part of the discussion and conclusion, which outlines the implications for practice suggested by the study. Authors should take care that these implications follow closely from the data presented, rather than from other literature. In the event that an article presents very preliminary data or conclusions, these paragraphs may be omitted.

## References

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# VIRTUAL PATIENT IN THE TEACHING OF PHARMACEUTICAL CARE: A SYSTEMATIC REVIEW

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**ABSTRACT**

**Objective:** To review the literature relating to the use of virtual patient methods in the teaching of pharmaceutical care to pharmacy students.

**Methods:** We searched the following electronic databases: EBSCO, Embase, LILACS, Medline, PubMed, Scielo, and Scopus. We reviewed original articles and reviews from experts published between January 1960 and December 2009, where virtual patients were used for teaching the practice of pharmacy in the educational setting. The following keywords were used: “virtual patient” and “pharmacy”, “virtual patient” and “pharmacist”, “virtual patient” and “medication”.

**Results:** The search identified 72, 10, and 157 articles using the terms “virtual patient” and “pharmacy”, “virtual patient” and “pharmacist”, “virtual patient” and “medication”, respectively. There was no publication found in the Scielo database. Only seven articles met the inclusion criteria, which most of the studies were conducted in North America.

**Conclusion:** The findings obtained show that there is few published articles in this area, in general, with lack of more realism of tools and international validation.

**Practice Implications:** The authors are developing and validating a computerized virtual patient tool for the Pharmacy course at the Federal University of Sergipe in Brazil, in partnership with the Department of Computer Science of this university.

**Keywords:** Virtual Patient, Pharmaceutical Care, Systematic Review

## 1. INTRODUCTION

In recent years, morbid-mortality related to medicine taking has been recognized as an important public health concern [1,2]. In the United States, adverse medicine events are responsible for around 10% of hospital admissions, and health care costs associated with medication-related problems surpass US$177 billion per year [3,4]. In Brazil, although there is a lack of studies in the area, since 1996 it has been recognized that adverse medicine events are a major cause of morbid-mortality [5].

Pharmacists play an important role in the prevention and management of drug therapy problems (DTPs) by delivering pharmaceutical care interventions, where the pharmacist provides patients with advice on safe and effective use of medicines, identifies potential DTPs, and intervenes when appropriate [2,6]. Lyra Jr. and colleagues (2007) conducted a study that revealed that Pharmaceutical Care interventions were effective in reducing DTP and improving patients' health; although the same study reported that at times the effectiveness of pharmacy-lead interventions was hampered by communication barriers between pharmacists and patients [7].

The pharmacists' skills to communicate effectively with patients is paramount in the prevention and a management of drug therapy problems [2,7,8]. The effective delivery of Pharmaceutical Care interventions requires not only good clinical knowledge of medication, but also good communication skills to interact with patients and review their medication needs and use. Indeed, over a decade ago, the World Health Organization (WHO) identified the ability to communicate effectively as skill pharmacists must possess in support of their role [9], prompting pharmacy schools throughout the globe to introduce communication skills as an integral part of the pharmacy curriculum. In contrast, most schools of pharmacy in Brazil are yet to implement communication skills in their curriculum, despite the fact that the

National Guidelines for Undergraduate Education in Pharmacy (2002) have included formal training in communication skills as an integral part of the pharmacy curriculum [10].

In developed countries, this recognition of the value of pharmacy in the prevention and management of DTPs, has lead to demonstrable efforts made by pharmacy schools to teach effective communication skills to students. Curriculum changes incorporated training on communication skills, including the introduction of theoretical-practical disciplines, as well as the establishment of practice laboratories to facilitate the implementation of communication skills [11-14]. In addition, different methods of teaching communication skills to pharmacy students have been developed, including face-to-face, telephone and email interviews; analysis of audio and video tapes; and simulated patient methods, in which actors play the role of patients or actual patients are coached to present specific scenarios to pharmacists in order to teach and evaluate patient assessment and interview skills [15-19].

In the last decade, virtual patient methods emerged as a new method of training health care providers on clinical and communication skills. In pharmacy education, the virtual patient is a simulated patient, typically produced by computer simulations, which simulate real-life clinical scenarios [20]. Virtual patient methods in health care education allow students to adopt the role of a fully qualified health care provider in a 'safe' environment and develop clinical and communication skills, such as patient assessment, interview skills, and information provision, without compromise the level of care provided to patients. This can be achieved through the use of a range of clinical scenarios applied to individual case-based assignments [21]. Typically, students interact with the virtual patients, because during the process of assessment they propose some intervention and record to complete the case. As computer generated virtual patients are available on demand, students are able to practice their clinical and communication skills at any time, thus enhancing clinical teaching.

An advantage of using virtual patients than tradicional learning is that the teaching of medication counseling is the virtual patient's skills to emulate the psychological state of the different types of patients, which pharmacists encounter in the routine practice of pharmacy (fearless, angriest, anxious, ambivalent, passive, assertive and persuasive)[12]. This not only provides future pharmacists with a realistic expectation, but also enhances the trainee's confidence in his/her medication counseling skills, increasing their sense of self-efficacy in dealing with all types of patients [22].

Another advantage of virtual patient methods is their ability to assess student skills. Hubal et a1. [19] argue that the use of case studies involving any of the three types of patients (real, simulated, virtual) is the best way of assessing student critical thinking skills. At least 94 medical schools in the United States and Canada currently employ simulated patients in their teaching programs, and 26 United States medical schools co-operate in resource-sharing, standard-setting, and other issues relevant to implementing effective simulated patient programs [19]. In addition, several interactive virtual patients have been developed during the last 10-15 years [21]. In Pharmacy, the first study with virtual patient was reported in the early 1990s [22]. Actually, there is only a paucity of published studies in the area.

The standardized nature of virtual patients also increases the validity of assessments, as each assignment is relatively consistent [20]. The use of the virtual patient allows students to develop their competences (knowledge, skills, and attitudes) in providing care to patients [24]. Therefore, it is necessary to invest in the teaching of pharmacotherapy and in the practice of pharmacist-patient communication, through the introduction of techniques, such as the virtual patient, which allow the simulation and the experience of real-world situations potentially optimizing patient care. The aim of this paper is to review the literature relating to

the aspects of use of virtual patient methods in the teaching of pharmaceutical care to pharmacy students.

## 2. METHODOLOGY

We searched the computer bibliographic databases of EBSCO, Embase, LILACS, Pubmed/Medline, Scielo, and Scopus. The following keywords and search strategy were used: “virtual patient” and “pharmacist”, “virtual patient” and “pharmacy”, “virtual patient” and “medication”.

To study the literature on the use of virtual patients in pharmacy, we retrieved articles from all six databases that met the following criteria: original articles and reviews from experts, published from January 1960 to December 2009 in the English language, where virtual patients were used for teaching competencies (skills, knowledge, and attitudes) related to pharmacist-patient interactions. We excluded studies in which the use of virtual patients occurred outside the discipline of pharmacy.

Abstracts resulted from the online searching were manually screened for relevance and eligibility for full text retrieval by reviewing their titles and contents. Articles indexed repeatedly in two or more databases were considered only once.

The following categories of data were extracted from selected articles: (1) setting where virtual patients were used; (2) scenary of the virtual consultation (outpatient, community pharmacy, hospital pharmacy); (3) number of students who used the virtual patient tool; (4) year of the student's degree; (5) student satisfaction with the virtual patient tool; (6) competences assessed; (7) role of instructors; (8) program development and (9) limitations.

## 3. RESULTS

The bibliographic search generated 72 studies using the terms “virtual patient” and “pharmacy”, ten studies with “virtual patient” and “pharmacist”, and 157 articles with the terms “virtual patient” and “medication”. Of these studies, only seven met the inclusion criteria, which formed the study sample.

Figure 1 shows the distribution of articles by database. All seven articles selected were indexed in the Scopus database, five of them were indexed concurrently in Embase, four in LILACS, three in Medline, and two in the EBSCO database. No publication was found in the Scielo database. Most excluded articles were indexed in the LILACS database.

INSERT FIGURE 1

Regarding to where the seven studies in the final sample were conducted: over half of these studies (n = 4) were conducted in North America [21-24]. The evidence reported in Table 1. Two articles were from Australia [21,26]; and one from Europe [27]. There was no publication from Latin America, Africa and Asia in the inclusion criteria used.

INSERT TABLE 1

All studies in the final sample were related to teaching of pharmacy practice in educational setting, with one multidisciplinary study [27], covering the disciplines of Pharmacy, Medicine, and Dentistry. It was noted that the study reported by Marriot [26] simply described the development and implementation of computer software for producing

virtual patients, with a later study complementing this initial one by addressing the use and application of the tool by pharmacy students [20].

The predominance of virtual patient tools used standardized clinical cases involving chronic illness and reflected professional practice scenarios simulating patient care in the community [22], outpatient setting [24], and hospital pharmacy [23]. The remaining articles did not state the location of patient care. However four from seven articles described the clinical scenarios used [20,21,26,27].

Regarding to the reported number of students who used the virtual patient tool, sample sizes ranged from 34 [23] to 212 students [20]. It is noteworthy that virtual patients were typically used up to third year of the Pharmacy curriculum [20,23]. However, in a study by Fuhrman et al. [22], pharmacy students started to use virtual patient methods on the first year of pharmacy and used for two years, in a number of different subjects (community pharmacy practice, institutional, advanced institutional/clinical and advanced community pharmacy) [22].

In this systematic review, the evaluation of virtual patient methods was conducted by questionnaires applied to participating students to determine their satisfaction about perceived importance, and usability of the virtual patient tools (Table 2). In addition, student competencies in pharmaceutical care interventions and in learning, and their ability to solve clinical cases were evaluated [20-24,27]. In all analyzed studies, students reported high degree of satisfaction with the virtual patient methods and found stimulating, innovative, and highly applicable experience to the practice of pharmacy in “real world”.

INSERT TABLE 2

Some of the reviewed studies included instructors from specific subject being taught who were made available to answer questions regarding to virtual patient environment, including how to access source of information necessary for solving clinical cases, and also to evaluate student responses and collect feedback [20-24]. Other studies did not include preceptors, with students being provided with oral or written instructions about the virtual program and/or relevant information for solving the clinical cases [21,27]. Assessment of the virtual patient methods took place in computer labs and at universities [23], via the web [20,22,26,27], e-mail [24], on computer programs [21,22]. In one study, this assessment was conducted at the students' home [22].

The study by Orr [24] was the only one that did not involve any software. Instead, via emails human patients (faculty members, community preceptors, and residents) were recruited for the virtual course. The patients recruited received an information package explaining what was expected from them, as well as oral instructions from the course coordinator. The materials included a detailed letter of instruction on the activity, their personal virtual patient profile, and a question schedule to track interactions. They were also provided with a list of standardized topic questions and an example of virtual interaction. During the course, the students interacted with virtual patients only via emails.

The studies reviewed varied in their report of limitations of the virtual patient methods [23,24,26]; some studies omitted limitations altogether [21,22] or reported no limitation [27]. Hussein, Kawahara [23] reported dependency on telephone and the number of telephone lines available as limitations [23]. For Marriott [26], virtual patient methods could only provide information from a database of standardized patients and randomly allocate clinical scenarios according to pre-set criteria [26]. Orr [24] reported that students were not focusing on verbal communication skills when working with the virtual patients; also, that they were unable to

interpret the patient's nonverbal communication such as facial expressions, tone of voice, demeanor, and appearance; and, that there was a lack of formal assessment of actual virtual patients on their satisfaction and perception of student learning [24].

## 4. DISCUSSION

Most of studies were carried out in the United States of America, what reflect the pioneering of this country in relation to virtual patient methods in the teaching, the investigations dating back to late 1990s [25]. It is important to emphasize that there are some recent studies that was not include on this review also develop in anothers universities in the same country [28-30]. Thus, it is essential disseminate these methods for others countries and evaluate these tools in future studies, providing the development of new competences in Pharmacy students.

In this review, studies using virtual patients with chronic disease in Pharmacy Education may help to understand clinical aspects of risk-management and continuity of care. According to literature, it seemed mandatory that the health care students, including Pharmacy, required specific training and new educative tools, such as virtual patients, to provide better quality of care and of life to real chronic patients [27,28,31-35]. Therefore, introduce virtual patients in Pharmacy Graduation could offer an effective method for teaching students, posing a challenge to educators.

Studies analyzed showed the lack of uniformity of the samples. In this area, studies demonstrated how virtual patient methods impact on clinical and communication skills of the study sample, but it not always generalize the results to others students [30,36]. We highlight that is need more studies with students of some colleges and schools of pharmacy using

virtual patient methods to accurate the validation of these methods as effective educational resources around the world.

The findings of this review revealed that the virtual patient methods have been utilized to learn Pharmaceutical Care in Graduation and PharmD Course [20-24,26,27]. The computer technology in Pharmacy education is large and can be used in other disciplines such as: pharmacokinetics, dispensing, calculations, and clinical therapeutics are well described in the literature [32-35]. Thus, virtual patient can be used during all the Course of Pharmacy like as an essential tool of health care education, as well as integral part of student and curricular assessment.

With the worldwide increase of Pharmaceutical Care practice adoption, satisfaction with virtual patient is a very important performance indicator of program educational effectiveness. For this reason, the student satisfaction assessment of virtual patient is necessary to help to pinpoint their strengths and identify different aspects need for improvement of virtual classes and tools [37]. In this review the students agreed that the virtual patient methods is an interactive and dynamic tool that helped them to understand the disease state, manage drug therapy regimens and allowed to apply what they were learning in other courses with additional attention to details [20-24,26,27]. Therefore, in designing future studies, researchers should consider student satisfaction assessment with virtual patient as an adaptive approach need to expand teaching of Pharmaceutical care.

The current review unveiled a paucity of studies involving virtual patients in the School of Pharmacy, probably pointing to an underutilization of these methods in Pharmaceutical Education. Health care education is going through fundamental change in relation to students' skills and approaches to learning. In the School of Medicine, virtual educational tools have been widely used and are considered important resources not only for

equipping students with clinical skill [36] (diagnostic and treatment) but also with communication skills [38,39]. This training method is also commonly implemented in other health care courses, such as nursing [40] and dentistry [40]. Our findings may indicate that Pharmacy as a discipline is lagging behind other health disciplines in the use of virtual patient methods for equipping students with clinical and communication skills. Therefore, Pharmacy educators must capitalize on the congruence between computerized virtual patient approaches and the level of comfort of graduate students with virtual technology.

Semeraro et a1. [42] emphasized that the role of instructor is important, helping the students to familiarize himself with the environment in relationship with himself and the patient and showing knowledge and communication skills will can be acquired with virtual patient practices. Some authors of this review described that instructors helped students in the decision-making process and response the clinical scenario [23]. Moreover, the instructors provided feedback on student's performance, from the strengths and weaknesses observed during the virtual patient counseling sessions [20, 24]. However, neither of studies analyzed if the instructors had some influence on the results obtained. We may suggest that in future studies to evaluate if the role of instructors improves or not the impact of virtual patient programs outcomes.

Two systematic reviews showed that there are many technology methods that can be used to teaching clinical competences such as: by telephone, by e-mail, analysis of audio and video tapes, web page as well as computer program [15,16]. Our review revealed some advantages of web page with a virtual patient include like as the portability and the realistic approach to patient care [23] and some limitation as few animations and interaction of the many complex interventions [24,26]. In future, the the researches need to optimize the

programs adding graphics and multimedia (sound, animation, text and avatars of patients), enhancing the interactions and education acquirement.

Despite the advantages of virtual patient methods in Pharmacy Education, the main limitation found in this review with virtual patients is the lack of an element of realism and cannot provide additional information in response to student's questions [20-24,26,27]. The Pharmacy students also were not focusing on verbal communication skills with virtual patient methods; also they were unable to interpret the patient's nonverbal communication [24]. Besides, it is needed to assess the reliability of knowledge and skills acquisition from virtual patient methods. Thus, it is relevant to explicit the limitations in the researches in Pharmaceutical Care for that new virtual patient tools and learn strategies will be developed, validated and disseminated.

## 5. CONCLUSION

The different aspects evaluated in this review revealed the use of virtual patients's methods could be an innovative educational strategy in Pharmacy Education, especially in the teaching of knowledge and skills aimed at optimizing Pharmaceutical Care. However, findings obtained show that there is few published articles in this area, in general, with lack of more realism of tools and international validation. In addition, ours results evidenced failure in aspects such as: uniformity of the samples, chronical diseases scenarios; levels of complexity to attend students to first undergraduate year until PharmD and evaluation of instructors influence in competences acquired by students.

Finally, futures studies will require refinement. For this, it is necessary to invest more resources in the development and improvement of patient virtual softwares to graduation and post-graduation students, if is possible in different countries, enabling internal and external

validation of the tools, create the largest possible number of practice scenarios that simulate real-world situations and that improvement in the Pharmaceutical Care practice.

## 6. LIMITATIONS

The present study is not without limitations. Firstly, only the keywords ‘‘virtual patient’’, ‘‘pharmacist’’, ‘‘pharmacy’’ and “medication” were used. The use of others relevant keywords, such as ‘‘pharmaceutical education’’ and ‘‘pharmaceutical teaching’’ not showed differences between these terms. Investigators did not search IPA (International Pharmaceutical Abstracts) database, which index pharmacy-specific journals that are not included in any other database. Consequently, it is possible that some studies that would have met inclusion criteria were left out of the review.

## 7. PRACTICAL IMPLICATIONS

This systematic review contibute to the authors to develop, apply and validate one virtual patient program on the teaching of Pharmacy School at the Federal University of Sergipe, in Brazil. This virtual patient tool will promote the increase of clinical and communication skills by pharmacy students in the discipline of Pharmaceutical Care and also will be used for training pharmacists from Brazil and other countries.

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**Figure 1:** Progress through the stages of the literature search.

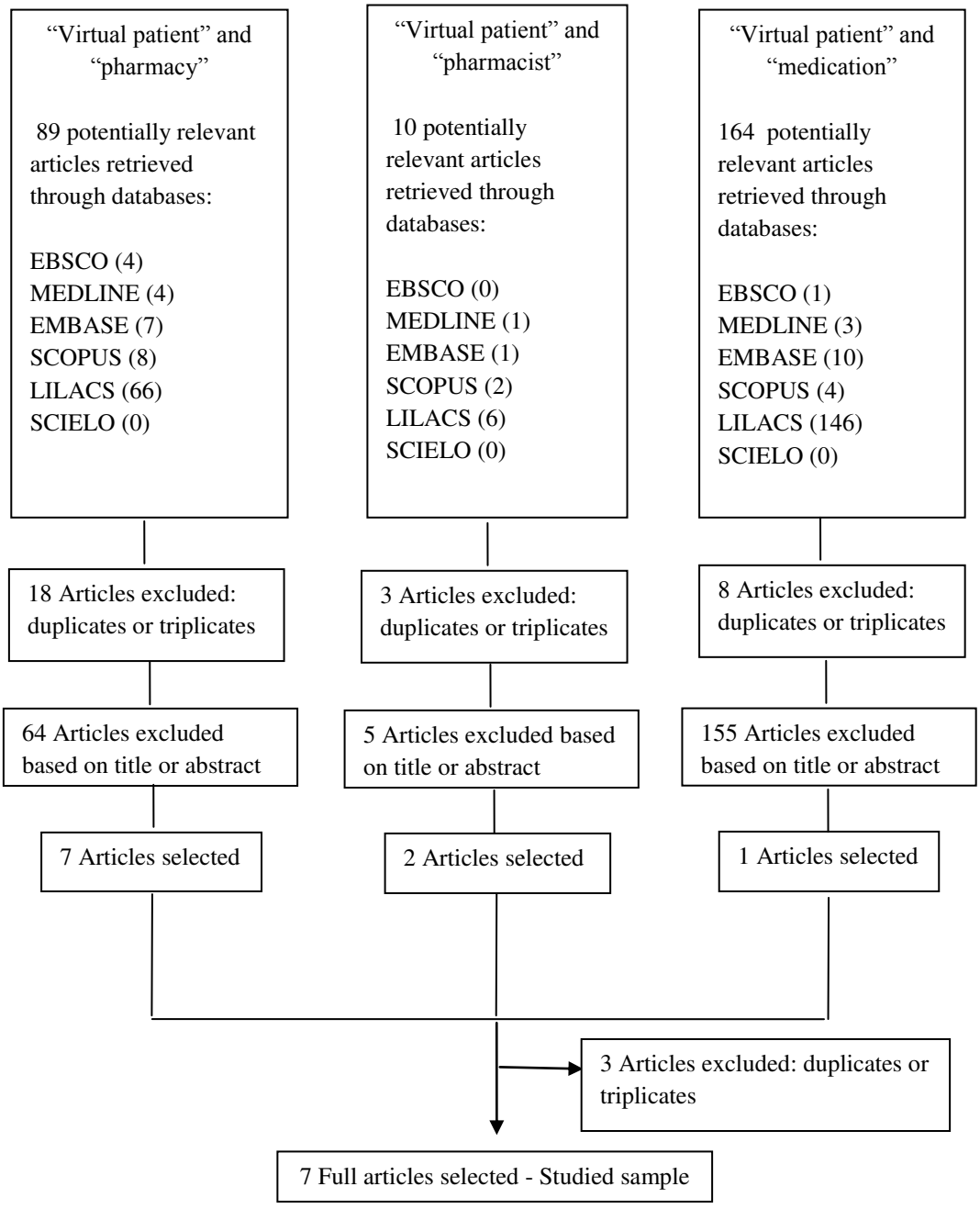

Table 1: Characteristics of the sample studies related to the use of virtual patient from 1960 to 2009.

| Reference | Setting/ Country | Scenary of the virtual consultation (outpatient, community pharmacy, hospital pharmacy) | Number of students (n) | Year of student's degree |
|---|---|---|---|---|
| Clifton Fuhrman Jr. et al., 2001 | College of Pharmacy, University of South Carolina – EUA | Community pharmacy | 57 | First year |
| Hussein e Kawahara, 2006 | School of Pharmacy, Loma Linda University – EUA | Each virtual visit represented a hospital day or a clinic visit | 34 | Third-year |
| Marriot, 2007[a] | Monash University, Australia | Scenarios on typical disease states that affect patients at a range of ages: respiratory and dermatological conditions | - | - |
| Marriot, 2007b | Monash University, Australia | Scenarios on typical disease states that affect patients at a range of ages: respiratory and dermatological conditions | 212 | Students in the third or fourth year of the Bachelor of Pharmacy course at the Victorian |
| Orr 2007 | University of Rhode Island, College of Pharmacy – EUA | Ambulatory or community | 81 | Third-year PharmD students |
| Villaume, Berger e Barker, 2006 | Harrison School of Pharmacy, Auburn University – EUA | Scenarios: arthritis, asthma, type 2 diabetes, gastroesophageal reflux disease, hypertension, and osteoporosis | 125 | First-year PharmD students |
| Zary et al., 2006 | Karolinska Institutet and Uppsala University in Sweden | Diagnosis: kidney failure, heart infarction, pulmonary edema and diabetes type I | 90 | High educational level (a few months from graduation) |

Table 2:.Characteristics of the virtual tools and student performance were analyzed from 1960 to 2009.

| Reference | Satisfaction with the VP | Competences assessed | Role of instructors | Program development | Limitations |
|---|---|---|---|---|---|
| Clifton Fuhrman Jr. et al., 2001 | Most of the students rated their experience as excellent or as good and the cases helped them understand the disease state of their "Virtual Patient" and that the knowledge acquired while participating in the project would be beneficial in the future. | Students were graded on their response with regards to, accurateness, thoroughness and timelines of their answer. | Evaluate and critique student´s answers. Available to students either in the computer lab or via e-mail to assist students with technical (computer) or patient care problems. At least once a week an instructor will debrief the class on patient scenario problems and ask for student input concerning the functioning of the informational technology interface. | College's web page. Most of the students reported using the Pharmacy Computer Lab, computers within the Integrated Pharmacy Practice Lab, or their home computers. | - |
| Hussein e Kawahara, 2006 | Most of the students agreed that the teaching approach used in the Pharmaceutical Care Laboratory course was significantly different from other teaching approaches that they had encountered; and the technology used in the data collection process consumed too much time. | Collect patient data (via an interactive voice response system); critically evaluate data and patient response to identify drug-related problems; and make recommendations to optimize therapy and patient outcomes, developing a comprehensive and longitudinal pharmaceutical care plan is practiced on a continuous basis throughout the course. End of the course was developed a final examination that would force the students to apply their knowledge gained as a result of the patient assessment and care plan process. | Help each group with their patient assessment and decision-making processes. To e-mail the plans to the instructor by the end of the 3-hour laboratory, as well as leave voice messages for the instructor with any medical/laboratory orders or questions. | The "IVR-TTS" system was develop a computer program tailored to administering a pharmaceutical care laboratory. The software is a telephony application that communicates any text to the user over the telephone with high quality, multi-tone voice capability. | Dependency on a telephone, and the number of telephone lines available. |
| Marriot, 2007a | - | - | - | The program has provided quick and easy access to a valuable database of standardised virtual patients that is used to provide authentic assessment for undergraduate pharmacy students. The database is flexible. Clinical scenarios can be added to the virtual patients according to pre-determined criteria. | Only able to provide information from a database of standardized patients and randomly allocate clinical scenarios according to pre-set criteria. |

Table 2: (Continued)

| Reference | Satisfaction with the VP | Competences assessed | Role of instructors | Program development | Limitations |
|---|---|---|---|---|---|
| Marriot, 2007b | Students reported that they felt the assignment was relevant to the subject being assessed and improved their learning. | Pharmacy students choose their own individual "virtual" patient using a purpose-designed computer program and respond to a clinical scenario. The student's response to the clinical scenario was assessed according to a criterion-referenced marking guide that indicated the expected level of response during an oral presentation of their case. | To evaluate the student's response to the clinical scenario in an oral presentation of their case to two independent tutors and an allocated group of 10–12 peers. Tutors and peers can provide feedback to the student both during and after the presentation. | - | - |
| Orr 2007 | Students were asked to complete a self-evaluation of their self-care skills. A survey instrument evaluating students' perceptions of the virtual patient interactions was also given at the end of the semester. Students felt significantly more confident in their self-care competencies at the end of the semester than at the beginning. The students agreed that the overall experience was valuable and improved their current self-care skills. | Written communication skills also improved over the semester. Within the assessment forms, students were graded on gathering all pertinent patient information, use of open- and closed-ended questions, providing clear nonprescription and non-pharmacological education, and communicating with the patient at a lay level. | Instructor evaluation of responses. | To recruit virtual patient for the course, e-mails were sent to faculty members, community preceptors, and residents explaining the need. The virtual patients were recruited, a packet of information was disseminated to them, as well as oral instructions from the course coordinator. The materials included a detailed letter of instruction on the activity (purpose, e-mailing logistics, interacting with the students, etc), their personal virtual patient profile, and a question calendar to track interactions. They were also provided with a list of standardized topic questions and an example interaction. | The Students were not focusing on verbal communication skills when working with the virtual patients. They were unable to interpret the patient's nonverbal communication such as facial expressions, tone of voice, demeanor, and appearance. An additional limitation of our study was the lack of formal assessment of actual virtual patients on their satisfaction and perception of student learning. |
| Villaume, Berger e Barker, 2006 | The project took too much time because of the complexities of the computer procedures resulting from the Virtual Patient being a prototype, and the computer procedures deflected attention from the critical thinking involved in writing the script. | Students were required to write a script for a working prototype of the Auburn University Virtual Patient. The script had to specify the text for the virtual patient's comments, 2-5 possible responses for the student pharmacist to choose from, and multiple interactional paths representing motivational interviewing, biomedical counseling, and a mix of the 2. | 1 of the authors was available most class days for consultation in his office. Extensive consultation was also provided with regard to the content of the scripts. | The Auburn University Virtual Patient (AUVP) developed a program to practice using motivational interviewing principles and strategies in patient counseling. | - |
| Zary et al., 2006 | Most of the students reported that had no problems learning to use the Web-SP system, the cases engaging, learned from using and found Web-SP fun to use. | The students are free to follow their own path of inquiry through the case, and may select from an extensive database of history questions, physical examinations and laboratory tests. The students get detailed feedback on their achievements at the end of each case. When finished examining a case, the student/learner is expected to enter a diagnosis, differentials and motivations based on the facts and reflective activities performed. | - | Web-SP was successfully implemented at several universities by taking into account key factors such as cost, access, security, scalability and flexibility. Pilot evaluations in medical, dentistry and pharmacy courses shows that students regarded Web-SP as easy to use, engaging and to be of educational value. | There are no inherent limitations in the system which means that Web-SP easily can support campus-wide implementations. |

# OBJETIVOS

# 3 OBJETIVOS

## 3.1 OBJETIVO GERAL

- Implementar uma ferramenta educativa do PV no ensino de competências (conhecimentos, habilidades e atitudes) para a prática da Atenção Farmacêutica dos estudantes de Farmácia da Universidade Federal de Sergipe (UFS).

## 3.2. OBJETIVOS ESPECÍFICOS

- Desenvolver um software piloto de PV para o ensino de competências para a prática da Atenção Farmacêutica de um grupo de estudantes brasileiros.

- Avaliar a satisfação de um grupo de estudantes brasileiros com o uso da ferramenta do PV no ensino da Atenção Farmacêutica.

# CAPITULO 1

# 4. PHARMA-PV NO ENSINO DE COMPETÊNCIAS PARA A PRÁTICA DA ATENÇÃO FARMACÊUTICA: UM ESTUDO PILOTO

**Article title:** Development and implementation of PHARMA-PV to teach competences for the Pharmaceutical Care practice: a pilot study

**Manuscript Format:** Formatting Manuscripts in American Journal of Pharmaceutical Education.

## Manuscript Organization

Instructions to Authors

Introduction

Research Standards

Manuscript Categories

Stylistic Considerations

Manuscript Organization

Manuscript Submission

## Introduction

The Journal is devoted to providing a forum for communication of relevant information for pharmacy educators and all others interested in the advancement of pharmacy education. To be considered for publication, manuscripts must directly relate to pharmacy education and provide useful information for the national or international audience of the Journal. If a submission has only local or regional relevance, its usefulness to the majority of readers is limited and thus will not be accepted. To ensure that only accurate and substantive articles are included, all manuscripts undergo a peer review process and editorial approval prior to acceptance.

## Manuscript Categories

Reviews. Reviews are comprehensive, well-referenced descriptive papers on teaching or research topics directly related to entry-level and graduate or postgraduate education and training or skill development. The Reviews section includes papers on the

history of pharmacy education. These manuscripts should not exceed 25 double-spaced pages for all components.

Research Articles. Research articles describe experimental or observational investigations that used formal methods for data collection and reporting of results of studies directly related to pharmacy education. The category does not include investigations of instructional methods or approaches. These manuscripts should not exceed 25 double-spaced pages for all components.

Instructional Design and Assessment. Instructional Design and Assessment papers describe novel methods for professional and graduate student instruction (lectures, laboratories, practice experiences, or courses), or informational manuscripts on programmatic and curriculum development. These manuscripts should not exceed 25 double-spaced pages for all components. Instructional Design and Assessment articles should conform to the IDEAS format as described in an updated article by Poirier et al. [Poirier T, Crouch M, Hak E, MacKinnon G, Mehvar R, Monk-Tutor M. Updated guidelines for manuscripts describing instructional design and assessment: the IDEAS format. Am J Pharm Educ. 2009;73(3):Article 55.]

(http://www.ajpe.org/view.asp?art=aj730355&pdf=yes)

Teachers' Topics. Teachers' Topics are invited manuscripts from those named Teachers of the Year at AACP member institutions. Teachers' Topics papers follow the IDEAS format as described above. These manuscripts should not exceed 25 double-spaced pages for all components.

Innovations in Teaching. Innovations in Teaching are invited manuscripts from recipients of the AACP Innovations in Teaching Award. These manuscripts should not exceed 25 double-spaced pages for all components.

Letters to the Editor. Letters to the Editor serve as a forum for the expression of ideas or for commenting on matters of interest. It is also an avenue for critiquing or expanding on the information presented in a previously published manuscript. Authors are required to identify themselves. The Editor reserves the right to reject, shorten, excerpt, or edit letters for publication.

Book and Software Reviews. Book and Software Reviews are brief documents that provide the reader with a clear understanding of content in a book or software program, as well as the product structure, scope, and limitations. The reviewer should state the value or utility of the product for instruction, research, or other academic activities.

AACP Reports and Minutes. AACP Reports and AACP Minutes are summaries of activity of officers, delegates, and committees within AACP.

**Research Standards**

For all manuscripts reporting on research involving human subjects (including educational and institutional research), the author should indicate in the cover letter that the research has been reviewed and approved by the appropriate human research or ethics review committee, or that it has been determined to be exempt from such review. For research that has undergone such review and approval, a statement to that effect should be included in the methods section.

All survey research must meet criteria established by the Journal's Editorial Board. Please refer to the following publications for guidelines:

- Draugalis JR, Plaza CM. Best practices for survey research reports revisited: implications of target population, probability sampling, and response rate. Am J Pharm Educ. 2009;73(8):Article 142.(http://www.ajpe.org/view.asp?art=aj7308142&pdf=yes)
- Draugalis JR, Coons SJ, Plaza CM. Best practices for survey research reports: a synopsis for authors and reviewers. Am J Pharm Educ. 2008;72(1):Article 11. (http://www.ajpe.org/view.asp?art=aj720111&pdf=yes)
- Fincham JE.Response rates and responsiveness for surveys, standards, and the Journal. Am J Pharm Educ. 2008;72(3):Article 43.(http://www.ajpe.org/view.asp?art=aj720243&pdf=yes)

**Stylistic Considerations**

The style specifications for the Journal must be followed. Below are general guidelines for manuscript format and style. If in doubt about style, authors should refer to the American Medical Association (AMA) Manual of Style, 10th ed, or consult a recent issue of the Journal.

Text. The text should be scholarly, readable, clear, and concise. Standard nomenclature should be used. Unfamiliar terms and acronyms should be defined at first mention. Manuscripts that were prepared for oral presentation must be rewritten for print. Authors of research papers are discouraged from writing excessively long introduction or discussion sections.

Word Style. Consult a current edition of Webster's dictionary for guidance on spelling, compounding, and word separation. Foreign words, not in general use, should be italicized. For proper use of chemical and biochemical terms, mathematical equations, mathematical expressions, special symbols, subscripts, superscripts, or Greek letters, please refer to the AMA Manual of Style.

Capitalization. The word "association" must be capitalized when referring to the American Association of Colleges of Pharmacy. When the word "journal" is capitalized and italicized as Journal, it can refer only to the American Journal of Pharmaceutical Education. In scientific writing, always capitalize the following: major words in titles and headings of manuscripts, designators for tables, figures, and appendices (eg, Appendix 1), eponyms (but not the noun that follows them, eg, Gram stain, Babinski sign), names of tests (eg, Beck Depression Inventory), genus names of organisms (but not the name of species, varieties or subspecies), acts of legislation (eg, Medicare), awards (eg, Nobel Prize), proprietary names (eg, Xerox copier), the title of a person when followed by the person's name (eg, Chair John W. Jones), official names of organizations and institutions (eg, Centers for Disease Control and Prevention), geographic places (eg, United States of America), sociocultural designations (eg, Republicans, French people), and historical events (eg, Vietnam War).

Abbreviations. In instances where repeated use of an organization or chemical name would become awkward, an official or accepted abbreviation may be substituted.

The abbreviation should be placed in parentheses immediately following the first use of the name in the main body of the text. Abbreviations of common pharmaceutical associations or organizations do not require periods or spaces between letters (eg, AMA). Abbreviations of "eg," and "ie," and "et al" should not be separated by periods. The names of US states and countries should be spelled out when they stand alone (eg, "…pharmacists throughout the United States..."). Do not use postal abbreviations for states in the text. The abbreviation "US" may be used as a modifier only when it directly precedes the word it modifies (eg, US health policies). Otherwise, it should be spelled out (eg, "…the population of the United States"). The names of all other cities, states, provinces, and countries should be spelled out when they occur within the text of the article. Refer to the AMA Manual of Style for additional rules regarding abbreviations.

Numbers. Numbers must be written as Arabic numerals unless they occur at the beginning of a sentence, in which case the number should be spelled out. The exception to this rule is when the number "one" is used in isolation within the text and substituting an Arabic number would seem awkward (eg, "there was only one logical solution to the problem"). A number containing a decimal must be styled as an Arabic number. All fractions must be written as decimal equivalents.

Measurements. The metric system will be used for all measurements; however, conventional units should be used instead of SI units. Do not use periods when abbreviating units of measure.

Reference numbers. Reference numbers cited in the text of an article should be superscript Arabic numerals placed at the end of the sentence, outside the final period or other punctuation. Subsequent citations to the same reference must be indicated by the same number originally assigned to that reference. Do not place parentheses around reference numbers cited in text.

Personal Communications. If the reference source for information in an article is from a personal communication, it should be referenced as such in parentheses immediately following the material to which it pertains. A personal communication reference must include the persons first initial and last name, type of communication,

and date (eg, T.L. Johnson, e-mail, October 2, 2002). AJPE requires that you obtain and provide to the Journal written permission from the person to use them as a reference.

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When submitting a manuscript in Editorial Manager, the manuscript document (usually a Word file) should be arranged in the following order: title page, abstract, text, references, tables, figures, and appendices. Editorial Manager allows authors to upload files with tables, figures, and appendices separately if that is more convenient.

Title Page. The title page should have the following information: a concise title, name of each author, terminal degree, academic/professional title and affiliation, and city and state where located. If an author has relocated to another institution, please include his/her affiliation during the time the author worked on the manuscript. At the lower left of the page, indicate the name of the corresponding author and provide his/her mailing address, telephone number, facsimile number, and e-mail address. At the bottom of the title page, indicate 3 to 5 keywords.

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Main Body of Text. The use of subheadings to divide the text is encouraged. Primary headings should be in bold upper case letters and should contain no more than 35 characters or spaces. Secondary headings should be in bold title case and appear above the paragraph. Tertiary headings should be in bold with only the initial letter capitalized. Tertiary headings should end with a period and should appear before the beginning of the first sentence in that section. Design and Methods sections should be written in the past tense voice. Authors should address in the Discussion or Conclusion how the work could be translated to other institutions.

Acknowledgments. Any special funding received for research that is the subject of the manuscript should be included under a section entitled "Acknowledgments" at the end of the text. If the authors wish to thank colleagues or others who provided assistance with their research or manuscript preparation, those acknowledgments also should be included under this section. Any statements concerning liability for the content of the manuscript may be included here as well (eg, "the ideas expressed in this manuscript are those of the author and in no way are intended to represent the position of…"). Conflicts in funding issues should be included.

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Each journal citation must include the surnames and complete initials of all authors. For manuscripts with 7 or more authors, the first 3 authors should be listed, followed by a comma and “et al.” The names of all periodicals cited must be abbreviated in accordance with abbreviations adopted by the National Library of Medicine and used in Index Medicus. An example and special instructions for specific

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Journal articles. For references to journal articles, list the names of the authors beginning with the last name of each author followed by his/her initials. After the authors' names, list the title of the article. The first letter of the first word of the title is upper case type, but the remainder of the title should be in lower case letters, except for the first letter of proper names. A period should be placed after the title. Next, provide the properly abbreviated title of the journal in italics followed by a period. Please refer to the journal list on PubMed for proper reference abbreviations (http://www.ncbi.nlm.nih.gov/journals). Finally, include the following numerical information: year of publication followed by a semicolon, volume number, issue number in parentheses, and a colon followed by page number(s). If the article does not appear on consecutive pages, use a semicolon between each segment of pages (eg, 172-175;179-183;199.)

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Chapter in a book. To reference a single chapter in a book, first list the authors and state the title as you would if citing a journal article. The chapter title should be followed by the word "In" followed by a colon. Next, list the name(s) and initials of the editors of the book, followed by a comma and the abbreviation “ed” or “eds” followed by a period. Next include the title of the book, location of the publisher, name of publisher, year of publication, and page numbers (same format as for a reference to an entire book (see previous example).

Example: Lyon RA, Titeler M. Pharmacology and biochemistry of the 5-HT2 receptor. In: Sanders-Bush E, ed. The Serotonin Receptors. Clifton, NJ: Humana Press;1989:59-88.

Thesis or dissertation. For references to theses or dissertations, place the title of the thesis or dissertation in italics. Include the location of the institution, its name, and the year the thesis or dissertation was completed.

Example: Thorn MD. A Comparative Review of the Statistical and Research Quality of the Medical and Pharmacy Literature [masters thesis]. Chapel Hill: University of North Carolina, 1982.

Online material. For references to journals, e-magazines, or other publications on the Internet, state the names of the authors, title of the article, publication title, and volume and publication date in the same format as you would for a journal reference. For references to other information, give the title of the Web page, followed by the name of the organization or Web site that published the information. For all references to online material, the author should include the uniform resource locator (URL) for the page of the Web site referenced (eg, www.hcfa.gov/stats.htm), followed by a period. Finally, write “Accessed” followed by the month, day, and year on which the information was obtained from the site, followed by a period.

Example: Healthy People 2010, Office of Disease Prevention and Health Promotion, U.S. Department of Health and Human Services. http://health.gov/healthypeople. Accessed May 25, 2010.

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Example: Adamcik B, Hurley S, Erramouspe J. Assessment of pharmacy students' critical thinking and problem-solving abilities. Am J Pharm Educ. In press.

Manuscripts that have been submitted to a publisher or journal but have not been accepted for publication cannot be included in the reference section. To attribute information in the text to an unpublished source, list the authors and date the manuscript was completed, along with the words “unpublished data.”

Example: “Similar results were achieved in a study of attrition rates in 2 Southeastern colleges of pharmacy conducted by P.T. Jones (unpublished data, 2009).”

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Tables.Tables should not duplicate information provided in the text. Instead, tables should be used to provide additional information that illustrates or expands on a specific point the author wishes to make. Each table should be self-explanatory and begin on a separate page in the document. Tables should be numbered using Arabic numbers according to the order in which they are referred to in the text. Tables should be created using Microsoft Word table formatting tools (do not use the tab key to form rows and columns of data as tab information is lost when the document is processed by the publisher). The table number and table title should be placed in the first row (merged to form a single cell) of the table. Data must be placed in separate cells within the table to prevent text and numbers from shifting. Footnotes should be placed at the bottom of the table inside a single row and ordered using superscript lower-case letters (beginning with “a”) rather than footnote symbols. A superscript letter

that refers the reader to the corresponding footnote should be inserted in the table title or body of the table. Refer to a current issue of the Journal for examples of table style.

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# PHARMA-PV NO ENSINO DE COMPETÊNCIAS PARA A PRÁTICA DA ATENÇÃO FARMACÊUTICA: UM ESTUDO PILOTO

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**RESUMO**

**Objetivo:** desenvolver e avaliar um software piloto de paciente virtual para o ensino de competências para a prática da Atenção Farmacêutica de um grupo de estudantes brasileiros.

**Aplicação do software:** foi testado na disciplina de Atenção Farmacêutica do último ano do Curso de Farmácia, por 32 estudantes. No do Pharma-PV foram realizadas análise do caso clínico, documentação, estabelecimento das intervenções e planos de cuidados.

**Resultados:** A maior parte dos estudantes foi do gênero feminino (n=21) e com predominância de 23 anos (n=14). Durante a resolução dos casos, houve 100% de concordância com o protocolo de documentação e 90% com o protocolo de intervenções e planos de cuidados. O instrumento quanti-qualitativo foi multidimensional e mostrou resultados positivos quanto ao uso do Pharma-PV.

**Conclusão:** Esse estudo piloto é inovador, pois desenvolveu e aplicou satisfatoriamente um software para o ensino de competências para a prática da Atenção Farmacêutica.

**Palavras-chave:** paciente virtual, Atenção Farmacêutica, educação em Farmácia.

## INTRODUÇÃO

A Atenção Farmacêutica é uma prática na qual o farmacêutico direciona as ações para o cuidado ao paciente por meio de provisão responsável da farmacoterapia, otimização dos resultados clínicos mensuráveis e da sua qualidade de vida.[1,2] Nos Estados Unidos, alguns estudos tem mostrado a efetividade da Atenção Farmacêutica em pacientes com Diabetes,[3,4,5] problemas cardiovasculares,[6,7] e em beneficiários de alto risco do Plano de Saúde Medicare.[8,9,10]

Nesse contexto, o farmacêutico é peça chave na orientação do paciente quanto aos seus medicamentos, identificando problemas e intervindo quando necessário para assegurar o uso seguro, apropriado e efetivo da farmacoterapia.[11,12] Em 1997, a Organização Mundial de Saúde (OMS) elaborou o relatório "Preparando o Farmacêutico do Futuro" afirmando que este profissional deve adquirir diversas competências para a prática da Atenção Farmacêutica.[13]

No Brasil, as Diretrizes Nacionais para o Ensino da Graduação em Farmácia incluíram a Atenção Farmacêutica como elemento constitutivo da formação do farmacêutico generalista.[14] Apesar disso, a maioria das universidades brasileiras ainda não introduziu conteúdos teóricos e práticos específicos em seus currículos que fundamentem a Atenção Farmacêutica em nível individual e coletivo. Em outros países, contudo, as mudanças curriculares, a inclusão de disciplinas teórico-práticas, assim como a construção de laboratórios de comunicação têm reafirmado a necessidade da formação voltada para o desenvolvimento do ensino da Atenção Farmacêutica.[15,16,17,18]

Estudos mostram que a introdução de técnicas de ensino e pesquisa voltadas para o desenvolvimento de competências farmacoterapêuticas e habilidades de

comunicação no cuidado ao paciente tem sido freqüentemente utilizadas, tais como: entrevistas presenciais, por telefone e por e-mails, bem como análise de fitas de áudio e de vídeo.[19,20,21,22] Vale ressaltar que o surgimento de técnicas inovadoras incluem o uso de pacientes simulados para o treinamento de estudantes de Farmácia e Farmacêuticos na habilidade de comunicação.[23,24]

A técnica de simulação com paciente virtual (PV) tem sido utilizada de forma eficiente e eficaz para treinar os estudantes da área da saúde em casos clínicos padronizados e resolução de situações do cotidiano.[25,26,27,28,29] Na Farmácia, o uso de PV também permite que os alunos aprimorem sua competência clínica e farmacoterapêutica, assim como habilidades de comunicação.[30] Assim, o objetivo deste estudo é desenvolver e implementarr um software piloto de paciente virtual para o ensino de competências para a prática da Atenção Farmacêutica de um grupo de estudantes de Farmácia brasileiros.

## METODOLOGIA

O software piloto foi desenvolvido por uma equipe multidisciplinar, envolvendo pesquisadores da área de Computação e Farmácia. O software foi projetado segundo uma metodologia de desenvolvimento iterativa e incremental, baseada na metodologia Rational Unified Process (RUP).[31] Esta metodologia foi adotada, pois apresentava um processo de desenvolvimento incremental e interativo, possibilitando a interação entre a os desenvolvedores (profissionais da Computação) e os mentores do sistema (profissionais da Farmácia) durante todo o processo de desenvolvimento do sistema.

A metodologia englobou quatro fases principais: concepção, elaboração, construção e transição. Na fase de concepção todos os requisitos (funcionalidades) do sistema foram levantados, por meio de entrevistas periódicas realizadas pelos

pesquisadores da Computação junto aos da área de Farmácia. Um modelo abstrato inicial do sistema foi apresentado pela Computação e validado pelo pessoal da Farmácia.

A partir da definição deste modelo, deu-se o início à fase de elaboração, incluindo a consecução de um planejamento mais detalhado do projeto e da definição da arquitetura do sistema. Para tanto, foi adotada a arquitetura de três camadas: interface, controle e dados. A camada de interface foi implementada utilizando a tecnologia Java Server Faces (JSF).[33] Para camada de controle foi implementada em linguagem Java[32] e a camada de persistência de dados utiliza a tecnologia Enterprise Java Beans (EJB),[34] com repositório de dados MySQL. A metodologia Java foi utilizada, visto que permite a independência de plataforma e é de domínio público, facilitando a portabilidade e escalabilidade da ferramenta. Além disso, estas ferramentas permitem que o sistema seja desenvolvido para Web, permitindo assim o acesso remoto e descentralizado dos estudantes e tutores, quando da sua aplicação na prática. Na finalização da fase de elaboração, o modelo inicial abstrato do sistema foi refinado e o projeto do sistema foi concretizado.

Em seguida, durante a primeira fase da validação, os membros da equipe de Farmácia acompanharam e validaram as decisões de projeto propostas da equipe de Computação. O software foi implementado na fase de construção e os testes foram gerados, incrementalmente, para cada módulo do sistema concluído. Os membros da equipe de Farmácia validaram as funcionalidades do sistema com a inserção e resolução dos casos clínicos na condição de usuários, o que permitiu a correção de vários erros de programação ou de não entendimento do solicitado pelo grupo de Farmácia.

Na fase de transição, segunda etapa da validação, o sistema foi instalado no seu ambiente real de execução para utilização por usuários reais (estudantes e tutores da

disciplina de Atenção Farmacêutica não necessariamente envolvidos na equipe de desenvolvimento do projeto). A versão final do software está disponível por meio do link "www.pharmavp.ufs.br".

Ainda nesta fase foram inseridos no software piloto casos clínicos referentes a diabetes mellitos e hipertensão arterial sistêmica. Os casos foram extraídos dos dados de pacientes reais atendidos no programa de Atenção Farmacêutica, realizado em uma farmácia comunitária da região Nordeste do Brasil.[35,36] No software foram cadastrados os dados demográficos, medicamentos prescritos e não-prescritos, médicos que atendem o paciente, exames físicos e laboratoriais e queixas clínicas. Deste modo, foi possível que os participantes do estudo documentassem os dados e resolvessem os casos clínicos com ênfase nos problemas relacionados aos medicamentos.

Durante a análise dos casos clínicos foi possível elaborar intervenções farmacêuticas e planos de cuidados específicos para cada um dos pacientes virtuais atendidos. Neste estudo, as intervenções foram definidas como um ato planejado, documentado e realizado junto ao paciente, que visa resolver ou prevenir problemas que interferem ou podem interferir na farmacoterapia, sendo parte integrante do processo de acompanhamento farmacoterapêutico.[37] O plano de cuidados consistiu no acompanhamento farmacoterapêutico semanal de pacientes que possibilita desenvolvimento das competências dos futuros farmacêuticos.[2] Neste estudo competência foi definida como "um agrupamento de conhecimentos, habilidades e atitudes inter-relacionados que afeta a maior parte do atividades profissionais, que se relaciona com o desempenho nessa atividade, que pode ser avaliado em relação a padrões de referência pré-estabelecidos, e que pode ser melhorado por meio de treinamento e desenvolvimento".[38]

O software piloto denominado Pharma-PV foi aplicado na disciplina de Atenção Farmacêutica do quinto ano do Curso de Farmácia da mesma universidade, a qual contava com 32 estudantes, distribuídos em seis grupos. Nesta disciplina, os estudantes aprenderam as noções básicas da teoria da Atenção Farmacêutica, bem como na prática a resolver casos simulados que acontecem no cotidiano da farmácia comunitária, por meio do raciocínio clínico e da tomada de decisões.

O sistema foi elaborado com três atores: o administrador (DPLJ), os tutores (MOJL, DTS e GCB) e os usuários (estudantes). Na prática, os usuários apresentaram uma abordagem genérica, de forma que os dois primeiros atores citados foram especializações com funções específicas dos usuários. O administrador foi responsável pelo cadastro dos tutores, mas também pôde realizar as funções do tutor.

Os tutores, estudantes de mestrado com experiência em cuidados farmacêuticos, foram responsáveis pelo cadastro, alteração dos casos clínicos e do gabarito de avaliação das consultas dos pacientes virtuais que foram realizadas pelos estudantes. Além disso, foram responsáveis pela geração de relatórios estatísticos que visavam avaliar a capacidade de resolução de problemas do estudante, bem como quantificar possíveis variáveis que pudessem influenciar nos resultados obtidos, como o gênero e o nível de formação pregressa dos estudantes.

## ENSINO DA ATENÇÃO FARMACÊUTICA – APRENDIZAGEM BASEADA EM PROBLEMAS

O estudo se fundamentou no uso de metodologias ativas de ensino-aprendizagem que visam envolver os alunos no processo de aprendizagem por meio do desenvolvimento ao pensamento crítico.[39] Dentre as metodologias destaca-se a aprendizagem baseada em problemas (PBL) que é um método de instrução

caracterizado pelo uso de problemas baseados na vida real para estimular o desenvolvimento de pensamento crítico, habilidades na solução de problemas e a aprendizagem de conceitos fundamentais da área de conhecimento em questão.[40]

O PBL é um método inovador de aprendizagem que estimula o estudante a construir conhecimentos, habilidades e atitudes a partir da resolução de casos práticos com trabalho em grupo ou individual, preparando os estudantes para enfrentar as situações práticas futuras. Na área da Farmácia, este método proporciona o contínuo desenvolvimento dos futuros profissionais.[20]

Neste estudo, ao longo do semestre foram apresentadas aos estudantes as bases teóricas da morbimortalidade relacionada a medicamentos. Em seguida a importância do farmacêutico na identificação, resolução e prevenção de problemas relacionados a medicamentos; modelos para a prática da Atenção Farmacêutica; posteriormente foram apresentados dois programas de seguimento farmacoterapêutico aplicados na prática de Atenção Farmacêutica. Em quatro aulas práticas, a turma foi dividida em seis grupos com cinco a seis estudantes cada, e os casos clínicos foram entregues para que fossem realizados planos de cuidados por meio de seminário, identificação, resolução e prevenção de problemas relacionados a medicamentos, documentação e seguimento da farmacoterapia.

Na primeira aula prática, utilizando o método PBL de ensino, os estudantes foram apresentados aos seis casos clínicos, previamente resolvidos conforme a literatura.[35,36] Durante quatro semanas, a turma teve tempo para resolver e apresentar os casos clínicos durante os seminários de avaliação para julgamentos pelos três tutores da disciplina quanto à forma de apresentação, documentação e resolução dos problemas farmacoterapêuticos. Os resultados de cada caso foram avaliados e evoluídos semanalmente e encaminhados pelos tutores, via email, aos grupos. Nas aulas

subseqüentes, os grupos apresentaram os planos de cuidados de acordo com a evolução, bem como a identificação, resolução e prevenção dos problemas relacionados a medicamentos. Após este período, foi introduzido o software Pharma-PV.

## ENSINO DA ATENÇÃO FARMACÊUTICA – APRENDIZAGEM BASEADA EM PROBLEMAS COM O PV

Inicialmente, foi realizada a apresentação da ferramenta para a turma e obtido o Termo de Consentimento Livre e Esclarecido de todos os 32 estudantes participantes do estudo. Para acesso ao software foi disponibilizado um laboratório de informática, com seis computadores, um por grupo.

Na primeira aula foi disponibilizado um computador por grupo (o mesmo da prática anterior) para que os estudantes realizassem o cadastro no sistema preenchendo os campos com dados sócio-educacionais sob supervisão dos tutores (Figura 1). Após cadastro, foi utilizado somente um login do líder do grupo que possibilitou o acesso ao software Pharma-PV.

Na segunda aula, os membros de cada grupo realizaram a seleção dos seus respectivos PVs. Assim, foi possível ter acesso as informações do PV (idade, gênero, estilo de vida, condições e queixas clínicas, medicamentos, alergias, resultados de exames laboratoriais e físicos) por meio de um relato de caso textual, o qual simulou o relato do paciente, opção de ajuda via e-mail sobre a ferramenta e opção de sugestões para o próximo encontro. A partir destas informações do PV, cada grupo realizou a documentação dos dados no sistema, o qual foi adaptado das fichas de documentação do Programa de Atenção Farmacêutica da Universidade de Minnesota[2] (Figuras 2, 3 e 4).

Ao finalizar a etapa de documentação, cada grupo encerrou a primeira consulta (primeira e segunda aulas) e foi liberado pelos tutores para realizar as correções. Os

tutores analisaram o preenchimento dos campos, utilizando o sistema e deixando comentários com a nota obtida durante a documentação (Figura 5) e enviaram a avaliação via e-mail. Quando ocorreu algum erro, os tutores recomendaram a revisão do caso para uma nova avaliação, na qual cada grupo teve três chances para resolver. Em seguida, os tutores habilitaram a segunda consulta, a qual o grupo deveria estabelecer planos de cuidados com possíveis intervenções farmacoterapêuticas completando os campos necessários para a resolução do caso, bem como quanto a problemas relacionados a medicamentos.

Na segunda consulta (terceira e quarta aulas) foram estabelecidas as intervenções e os planos de cuidados, havendo nova avaliação pelos tutores. Caso o grupo conseguisse avançar, o caso clínico era evoluído de acordo com os planos de cuidados estabelecidos adicionando novas informações e exames. Ao final deste estudo, os estudantes preencheram um instrumento (sem identificação) com questões quanti e qualitativas para avaliar a satisfação quanto ao uso do paciente virtual.

As questões quantitativas utilizadas foram adaptadas para o português de um instrumento proposto por Kolesar e Pitterle[45] composto de nove questões e classificadas de acordo com a escala de cinco pontos de Likert,[46] variando de "concordo totalmente" a "não se aplica" (Tabela 1). Os dados quantitativos foram avaliados pelo programa Epi Info 3.4.3 e as variáveis apresentadas em médias e desvio-padrão. Os dados qualitativos foram agrupados de acordo com os depoimentos dos estudantes, abordando pontos positivos e negativos do programa e opinião sobre a atuação dos tutores.

## RESULTADOS

Dos 32 estudantes do quinto ano do Curso de Farmácia, todos concluíram a atividade com o paciente virtual como parte de avaliação da disciplina de Atenção

Farmacêutica. Os dados sócio-educacionais revelam que a faixa etária dos estudantes variou de 21 a 28, com predominância de estudantes com 23 anos (n=14;- 44%). A maior parte dos estudantes foi do gênero feminino (n=21; 66%) e frequentemente acessavam a internet em casa (n=30; 95%) e Faculdade (n=18; 57%). Todos os estudantes referiram ter cursado disciplinas obrigatórias como Introdução à Farmácia e Assistência Farmacêutica, destes 26 fizeram Farmácia Clínica e 11 Tópicos em Farmácia Clínica.

Durante o uso do software, quatro grupos acertaram a documentação dos dados demográficos e farmacoterapêuticos do caso clínico na primeira tentativa da primeira consulta, destes apenas dois grupos obtiveram 100% de concordância com o protocolo de documentação. Por outro lado, dois grupos precisaram da segunda tentativa para avançar na evolução do caso. Vale ressaltar que todos os grupos obtiveram mais de 90% de concordância com o protocolo desta consulta. Todos os grupos concluíram a segunda consulta na primeira tentativa, com resultados variando entre 65 e 90% de concordância com o protocolo de intervenção.

O instrumento quantitativo utilizado para avaliar a satisfação do estudante foi multidimensional e avaliou quatro aspectos, referentes à: competências e dificuldades prévias para a resolução dos casos, estrutura disponível para a resolução dos casos, competências adquiridas com o programa, bem como satisfação geral do programa (Tabela 1).

INSERIR TABELA 1

Os resultados obtidos relacionados às competências e dificuldades prévias para a resolução dos casos (itens 1, 3 e 6) mostraram que apenas um estudante (3%) referiu

estar em desvantagem porque apresentava pouca habilidade com o uso do computador. Em contraste, 23 (77%) dos estudantes gastaram muito tempo resolvendo o caso clínico e 14 (47%) não "puderam aprender no seu ritmo".

Quanto à estrutura disponível para a resolução dos casos (item 2), menos da metade dos alunos (37%) gastaram muito tempo aguardando para usar um computador. Ademais, 28 (93,4%) estudantes citaram que não podiam ver os resultados dos casos clínicos imediatamente (item 4).

Os dados ainda revelaram que 70% dos estudantes podem ter adquirido mais conhecimento sobre a farmacoterapia e habilidades úteis para a prática clínica com o programa (itens 7 e 8). Na satisfação geral do programa (itens 5 e 9), 25 (78%) dos estudantes concordaram que a experiência foi única para o aprendizado e gostariam de usar o PV novamente.

Neste estudo, alguns comentários dos estudantes (Tabela 2) relacionados ao desenvolvimento de competências ilustram que o PV possibilitou a chance do estudante estudar mais para resolver o caso clínico e colocar em prática os conhecimentos adquiridos na teoria, bem como desenvolver conhecimentos e habilidades para o manejo da farmacoterapia e cuidado ao paciente. Porém, alguns estudantes citaram que o software não contribuiu para o desenvolvimento da comunicação com o paciente real, impossibilitando o aprofundamento de algumas questões associadas à subjetividade do paciente.

INSERIR TABELA 2

Os pontos relacionados ao programa indicaram que o Pharma-PV é fácil de ser utilizado, pois ensina como organizar um caso clínico, aplicando conhecimentos e

habilidades para elaboração de intervenções farmacêuticas. Entretanto, o programa apresentou restrição de informações, uma vez que o banco de dados é limitado e tem pouca interatividade entre paciente e estudante.

Os estudantes citaram que os tutores tinham conhecimento sobre o programa e Atenção Farmacêutica, auxiliando nas resoluções dos casos clínicos e ficando disponíveis para solucionar as dúvidas, mesmo fora da sala de aula. No entanto, os estudantes concordaram que havia poucos tutores, além de explicitar a necessidade de um treinamento prévio que evitasse a divergência de opiniões entre os mesmos. Neste caso os comentários suscitam discussão, pois havia um tutor para cada dois grupos, o que poderia ser considerado suficiente. Outra alternativa, em próximos estudos, será diminuir o número de estudantes por grupo, mantendo a mesma proporção, o que pode possibilitar maior proximidade e acesso aos tutores

Os estudantes também afirmaram que o Pharma-PV proporcionou um primeiro contato com a prática da Atenção Farmacêutica e que os pacientes virtuais simulam o cotidiano da farmácia comunitária, contribuindo para o aprendizado do atendimento farmacêutico. Todavia, a falta do contato direto com o paciente impossibilita a relação de empatia, vínculo de confiança, bem como a realização de todas as intervenções e desfecho clínico indispensáveis no seguimento farmacoterapêutico.

## DISCUSSÃO

Neste estudo, o uso do software pode ter possibilitado aos estudantes conhecer mais sobre farmacoterapia, bem como desenvolver a habilidades de documentar e realizar intervenções. Outros estudos também mostram que o emprego de softwares educativos, como o Pharma-PV, permite o desenvolvimento de competências durante a

graduação e pós-graduação. [22,30,38,41-44] Dessa forma, a inserção de novas tecnologias no processo de ensino-aprendizagem pode promover a formação continuada, por meio de treinamento, reciclagem e aperfeiçoamento de estudantes de Farmácia e Farmacêuticos.

O uso do Pharma-PV fez com que os estudantes entendessem a necessidade de aprimorar mais os conhecimentos e habilidades sobre o manejo da farmacoterapia. A literatura ratifica que após o uso de softwares educativos os estudantes ficam mais pró-ativos e propensos a se aprofundar na qualidade de sua documentação, nas intervenções e elaboração de plano de cuidados.[22,30,38] No entanto, Fuhrman Jr. e colaboradores ressaltaram que as ferramentas virtuais podem integrar várias disciplinas ao longo do Curso de Farmácia, alicerçando o estudante com competências prévias que facilitem a aprendizagem da Atenção Farmacêutica.[38]

Outro importante resultado obtido mostra que quase metade dos estudantes não "puderam aprender no seu ritmo". Provavelmente, o uso dessa ferramenta em disciplinas anteriores como Farmácia Clínica ou Assistência Farmacêutica, ou mesmo, em um número maior de aulas poderia dar mais familiaridade ao uso das tecnologias, atender as demandas individuais dos estudantes e favorecer a aprendizagem. Benedict afirma que o emprego de PV pode ser essencial para o desenvolvimento de metodologias de ativas de ensino-aprendizagem e aplicada em várias disciplinas, considerando as necessidades e ritmo de cada aluno.[28] Para tanto, é preciso desenvolver softwares cada vez mais interativos, com banco de dados mais amplos, flexíveis e capazes de fornecer informações adicionais que atendam as necessidades individuais de aprendizagem durante a resolução dos casos.

Embora neste estudo tenham sido disponibilizados dois laboratórios para acesso ao Pharma-PV, alguns estudantes afirmaram gastar muito tempo aguardando para usar o

computador e que não podiam ver os resultados dos casos clínicos imediatamente. Hussein e Kawahara também relataram a dificuldade dos estudantes para acessar o software, aguardando a disponibilidade para acessar o sistema no laboratório e ver os resultados.[22] Outros estudos mostram que o acesso via programa específico[44], via web[25,38,41,42] ou e-mail[30] pode reduzir estes problemas, facilitando ubiquidade e interatividade do PV em diferentes ambientes fora da sala de aula.

Neste estudo a relevância da tutoria foi corroborada pela literatura.[22,30,38,41,43] Uma das principais vantagens está associada a natureza individual do PV, pois diminui a possibilidade de plágio e estimula que cada estudante aprenda a avaliar seu respectivo caso clínico e seja treinado a tomar as decisões necessárias para o cuidado ao paciente.[42] Além disso, proporciona a discussão em grupo das diferentes alternativas usadas por cada estudante, aumentando o elenco ou arsenal de possibilidades de resolução de problemas e pode facilitar a tomada de decisão em situações reais. Os estudos também relatam que o suporte dado pelos tutores, durante a aplicação da maioria dos softwares disponíveis, permitiu esclarecimento das dúvidas sobre o programa, indicação de fontes de informações necessárias para a resolução dos casos, discussão sobre o processo de tomada de decisão, avaliação das respostas e o feedback para os estudantes.[22,30,38,43] No entanto, é preciso que os tutores dominem o software, estabeleçam protocolos de cuidados aos pacientes virtuais e realizem reuniões de consenso periódicas sobre as alternativas de resolução do casos clínicos, reduzindo possíveis confundimentos que interferem na mediação do processo de ensino-aprendizagem.

Quanto à satisfação, os estudantes concordaram que o Pharma-PV proporciona uma experiência única de aprendizado e gostariam de usá-lo mais vezes. Diversos estudos da literatura corroboram que o uso do PV é uma metodologia ativa de ensino-

aprendizagem que deveria ser usada frequentemente, pois permite aquisição de conhecimentos clínicos de forma inovadora e melhora as habilidades para o cuidado ao paciente.[22,25,28,30,38,41-43] Os achados qualitativos encontrados reforçam o valor do Pharma-PV e estão de acordo com outros estudos, nos quais os softwares foram considerados fundamentais para mimetizar situações reais do seguimento farmacoterapêutico.[22,38] Todavia, os autores ressaltam que esse método de ensino é complementar, não substituindo as entrevistas simuladas e reais, mas auxiliando no treinamento e desenvolvimento de competências para prática farmacêutica.

O ensino baseado na resolução de casos clínicos virtuais pode estimular o estudante de Farmácia a aprender de maneira pró-ativa, aprofundando conhecimentos, desenvolvendo habilidades práticas, responsabilidade e auto-confiança.[28,29,38] Porém, outra importante limitação é a falta de contato com o paciente real, que impossibilita avaliar a comunicação verbal e não-verbal, bem como o aprofundamento de questões subjetivas do paciente.[30] Nesse sentido, é fundamental que os Cursos de Farmácia utilizem tais práticas de forma complementar, proporcionando a resolução de diferentes casos clínicos de acordo com o nível de formação do estudante e sua capacidade de enfrentar situações reais.

## CONCLUSÃO

Este estudo piloto desenvolveu e aplicou um software inovador para o ensino de competências para a prática da Atenção Farmacêutica em língua portuguesa. Assim, os resultados mostraram que o Pharma-PV foi efetivo para o ensino de competências para a prática da Atenção Farmacêutica de um grupo de estudantes brasileiros. Ademais, os estudantes afirmaram estar satisfeitos com o uso da ferramenta e consideram relevante no desenvolvimento.

No futuro serão necessários novos estudos que otimizem ainda mais a interatividade do Pharma-PV e sua validade externa, com um grupo maior de estudantes. Essa ferramenta pode permitir o desenvolvimento de habilidades clínicas e de comunicação para estudantes de Farmácia e também pode ser utilizada para o treinamento de farmacêuticos do Brasil e de outros países.

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**Figura 1. Fragmento de tela de cadastro do estudante**


**Figura 2. Fragmento de tela de análise do caso clínico (Dados sócio-demográficos)**

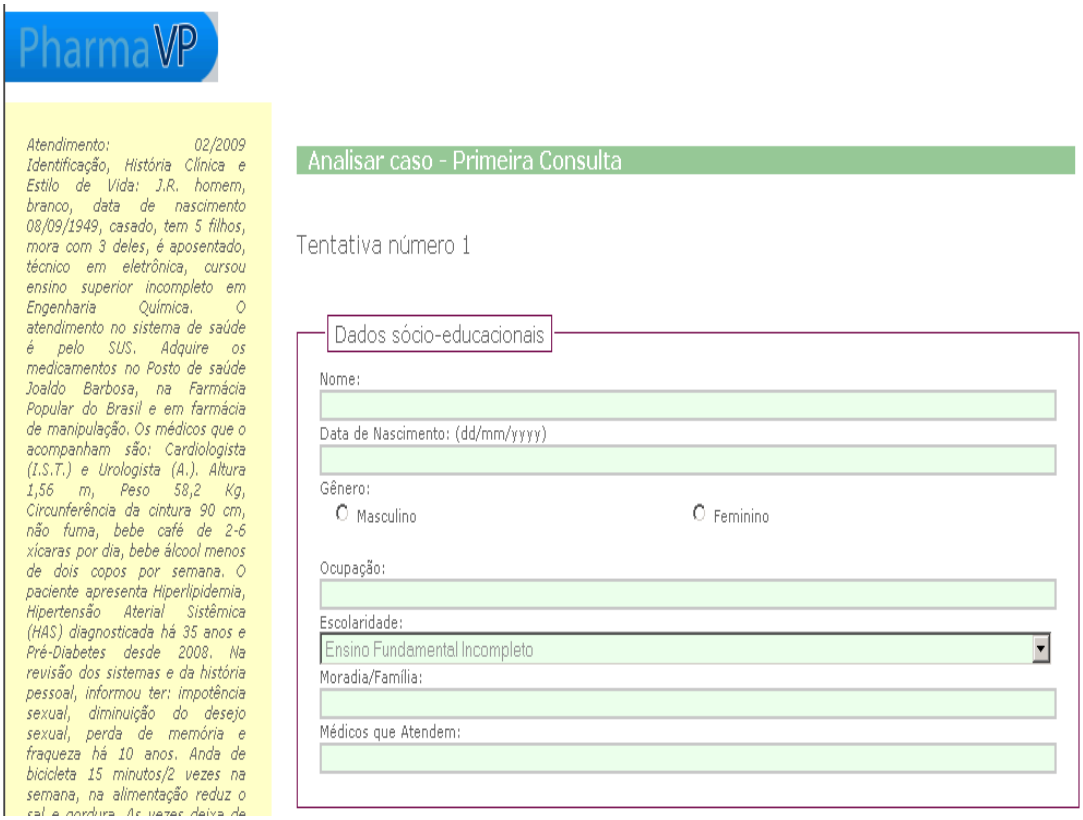
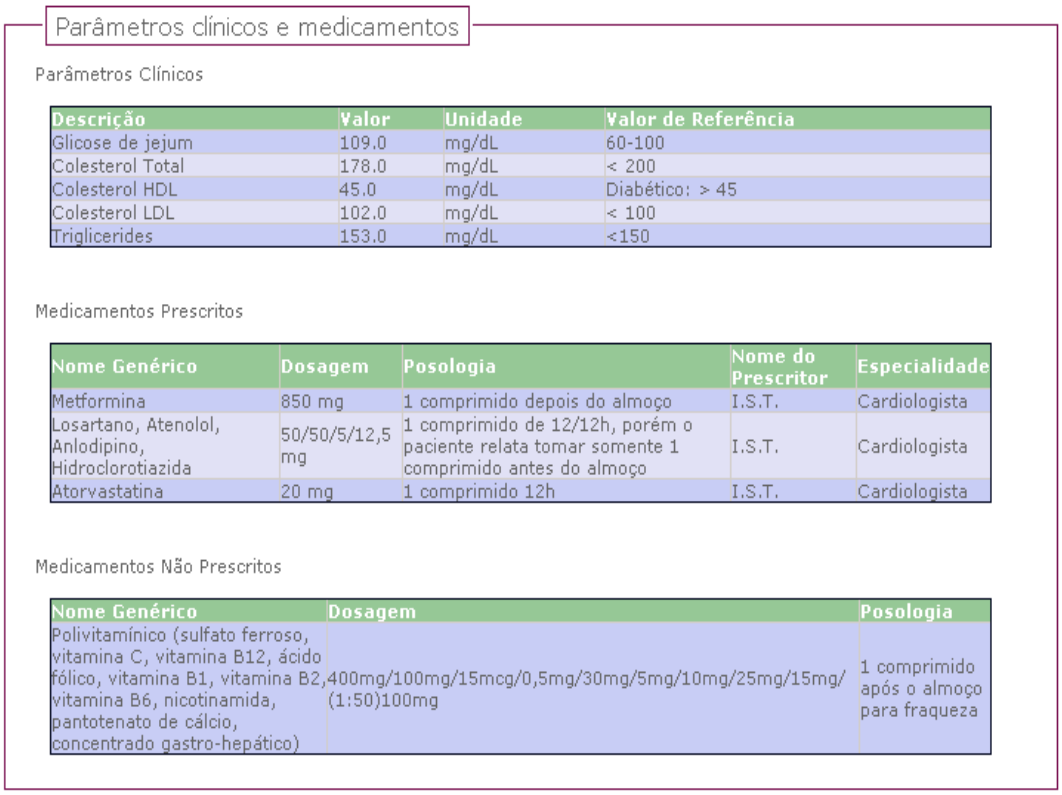


**Figura 3. Fragmento de tela de análise do caso clínico (Parâmetros clínicos e medicamentos)**



Parâmetros clínicos e medicamentos

Parâmetros Clínicos

| Descrição | Valor | Unidade | Valor de Referência |
|---|---|---|---|
| Glicose de jejum | 109.0 | mg/dL | 60-100 |
| Colesterol Total | 178.0 | mg/dL | < 200 |
| Colesterol HDL | 45.0 | mg/dL | Diabético: > 45 |
| Colesterol LDL | 102.0 | mg/dL | < 100 |
| Triglicerides | 153.0 | mg/dL | <150 |

Medicamentos Prescritos

| Nome Genérico | Dosagem | Posologia | Nome do Prescritor | Especialidade |
|---|---|---|---|---|
| Metformina | 850 mg | 1 comprimido depois do almoço | I.S.T. | Cardiologista |
| Losartano, Atenolol, Anlodipino, Hidroclorotiazida | 50/50/5/12,5 mg | 1 comprimido de 12/12h, porém o paciente relata tomar somente 1 comprimido antes do almoço | I.S.T. | Cardiologista |
| Atorvastatina | 20 mg | 1 comprimido 12h | I.S.T. | Cardiologista |

Medicamentos Não Prescritos

| Nome Genérico | Dosagem | Posologia |
|---|---|---|
| Polivitamínico (sulfato ferroso, vitamina C, vitamina B12, ácido fólico, vitamina B1, vitamina B2, vitamina B6, nicotinamida, pantotenato de cálcio, concentrado gastro-hepático) | 400mg/100mg/15mcg/0,5mg/30mg/5mg/10mg/25mg/15mg/(1:50)100mg | 1 comprimido após o almoço para fraqueza |

**Figura 4. Fragmento de tela de análise do caso clínico (Revisão de sistemas)**

**Figura 5. Fragmento da avaliação do tutor**

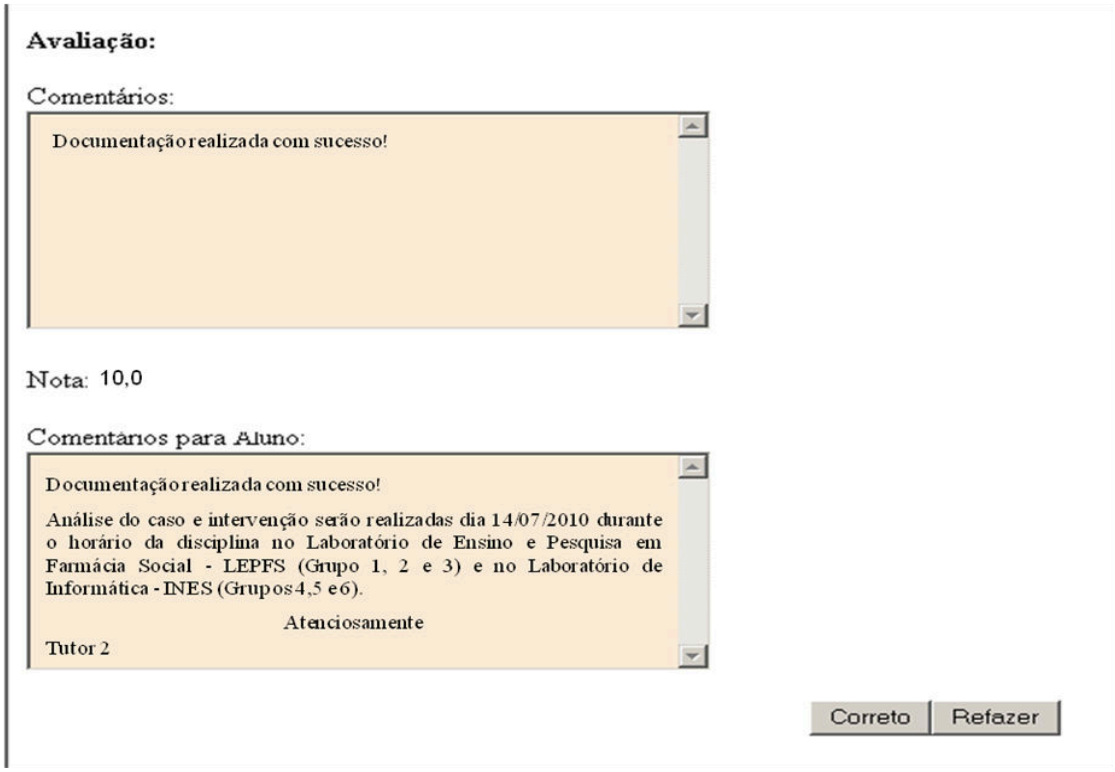



Tabela 1 – Avaliação da satisfação dos estudantes quanto ao uso do Pharma-PV, adaptado de Kolasar e Pitterle (2002)

| Questões de avaliação | Média (Desvio Padrão) |
|---|---|
| 1 - Eu gastei muito tempo resolvendo o caso clínico | 2,1 (0,8) |
| 2 - Eu gastei muito tempo aguardando para usar um computador | 2,9 (1,1) |
| 3 - Eu pude aprender no meu ritmo | 2,4 (0,7) |
| 4 - Pude ver resultados imediatamente | 3,4 (0,6) |
| 5 - Isso é uma experiência única de aprendizado | 1,9 (0,8) |
| 6 - Estou numa situação de desvantagem porque tenho poucas habilidades com computador | 3,8 (0,6) |
| 7 - Eu estou adquirindo habilidades úteis para a prática clínica | 2,3 (1,1) |
| 8 - O PV tem aumentado meu conhecimento sobre farmacoterapia | 2,3 (1,1) |
| 9 - Eu gostaria de usar o PV de novo | 1,9 (0,9) |

Resposta dos estudantes (1-6, 1= concordo totalmente, 2= concordo, 3= discordo, 4= discordo totalmente, 5= nenhuma base para julgamento, 6= Não se aplica - NA)

Tabela 2. Comentários qualitativos dos estudantes sobre o uso do Pharma-PV.

| Temas | Pontos positivos | Pontos negativos |
|---|---|---|
| **Desenvolvimento de Competências** | *"Dá oportunidade para o aluno colocar em prática os conhecimentos* adquiridos e aprimorar suas habilidades quanto ao manejo da *farmacoterapia e intervenções farmacêuticas".*<br><br>*"Proporciona conhecimento sobre farmacoterapia e cu*idado ao paciente para que possamos treinar antes de realizar um atendimento real, tornando-se mais hábeis para a atividade da Atenção *Farmacêutica".*<br><br>*"Nos obriga a estudar muito para resolver o caso clínico. Além disso,* foi o primeiro contato com a parte de documentação, sendo válido *para adquirir experiência clínica".* | *"Não contribui para o desenvolvimento da comunicação ou técnicas de entrevista clínica".*<br><br>*"a falta de contato com o paciente real impossibilita aprofundar* algumas questões e traçar um perfil *subjetivo do paciente".* |
| **Relacionados ao programa** | *"É um programa fácil de ser utilizado e bastante interessante para colocar em prática os conhecimentos e habilidades".*<br><br>*"Fácil visualização do caso clínico, facilitando possíveis intervenções".*<br><br>*"Possibilita* a melhor forma de organizar um caso clínico, quanto a documentação, e melhor aprendizado sobre Atenção Farmacêutica. É um processo dinâmico que impossibilita avançar as etapas se as inter*venções estiverem incorretas".* | *"O programa tem restrição de informa*ções. Precisa de mais opções de *queixas e intervenções".*<br><br>*"O programa poderia ser mais interativo".*<br><br>*"O programa ainda está em fase inicial, mas ao invés do relato de* caso textual, poderia inserir um vídeo curto do paciente contando seus problemas e medicam*entos utilizados".* |
| **Valor do programa** | *"Primeiro contato com a prática da Atenção Farmacêutica. Dá noção do que será encontrado quanto tiver o contato com um paciente real".*<br><br>*"O programa nos mostra pacientes virtuais muito parecidos com* paciente da prática do dia a dia. Auxilia o aprendizado aproximando o *farmacêutico do paciente, mesmo que de forma simulada".*<br><br>*"Proporciona o aprendizado quanto à prática do atendimento ao paciente, com casos clínicos reais".* | *"Falta do contato direto com o paciente o que não* possibilita a relação de empatia e vínculo de confiança que são indispensáveis no programa de seguimento farmacoterapêutico. Também faltam respostas as perguntas necessárias e pertinentes, falta da realização de todas as intervenções propostas e do desfe*cho clínico".* |

| | | |
|---|---|---|
| **Importância dos tutores** | *"Os tutores eram atenciosos, esclareciam todas as dúvidas e davam um ótimo suporte no uso do programa".*<br><br>*"Os tutores estavam abertos ao diálogo, demonstraram conhecimento* e paciência para explicar as resoluções d*os problemas".*<br><br>*"Os tutores sabiam muito sobre Atenção Farmacêutica. Eles ajudaram* bastante na parte clínica e tiravam as nossas dúvidas, mesmo fora da *sala de aula"* | *"Havia poucos tutores para muitos estudantes"*<br><br>*"É preciso treinamento para que as informa*ções passadas sejam claras, objetivas e o aluno possa entender realmente o que deve ser *feito".*<br><br>*"Por ser algo novo, em algumas situações, não havia consenso e houve divergência de opiniões entre os tutores."* |

## 5. CONSIDERAÇÕES FINAIS

O conjunto dos resultados apresentados permitiu visualizar a necessidade de desenvolver e a aplicar um sistema que simula paciente reais, dentro do contexto do ensino de Atenção Farmacêutica. Assim, o desenvolvimento de softwares como o Pharma-PV pode contribuir para a consolidação do novo paradigma farmacêutico que está emergindo no país.

Além disso, os resultados específicos demonstraram que:

- A revisão sistemática mostrou a escassez de estudos na literatura e ratificou a necessidade de criação softwares educativos para estudantes de Farmácia que possibilitem mimetizar situações reais de cuidado ao paciente.

- O desenvolvimento e aplicação do software Pharma-PV demonstrou que o sistema é efetivo e que permite a utilização pelos estudantes de Farmácia da UFS.

Ante ao exposto, novos estudos podem ser realizados com o obejtivo de externamente o software Pharma-PV em outras universidades autorizadas para tal, já que o sistema executa em ambiente Web. Para tanto, será necessário aprimorar o Pharma-PV, a partir das sugestões dos alunos e dificuldades encontradas na validação interna, bem como incluir e testar recursos multimídias na atualização do software.