



Burn Care in a General Hospital in the City of São Carlos, Brazil: Active Learning Methodology

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Abstract

Introduction: Injuries caused by burns are responsible for a great number of absence from work, functional and aesthetic sequelae. The Problem Based Learning (PBL) consists of student-centered teaching and based on problems solution. It valorize besides the content to be learned, the form of learning, reinforcing the active role of each student in this process, allowing learning to learn.

Objective: To demonstrate the process of teaching-learning used during medical school internship at Federal University of São Carlos-UFSCar, figuring as a trigger the care of a medium burn patient.

Method: The trigger used to initiate the studies was the care of a burned patient that was transferred to the General Hospital in the city of São Carlos, Brazil after first medical care at a neighbor county at Brotas, Brazil. Using active methodology- Problem Based Learning- it was accomplished a systematic literature review to guide service, and provide to the patient the most up to date knowledge.

Results: Provisional Synthesis: The importance of proper handling of a medium and critically burn patient in a general hospital to reduce morbidity and mortality was highlighted. Then, a systematic literature review was accomplished, consulting main databases, protocols to burn patient's care and electronic databases to complement the studies of inherent case served. After 21 days of burn, the patient presented a good evolution condition, with completely re-epithelialized wounds and normal laboratory parameters, with nosocomial discharge without sequelae.

Conclusion: Active learning methodology showed to be a very effective and enriching method in process of teaching-learning, bring to students not only the knowledge but also the exposure to a clinical non-controlled experience, potentializing with success, teaching and assistance.

Keywords: Problem Based Learning; Case Study; Burn; Critically Burn Patient; Therapy

Introduction

Injuries caused by burns are responsible for a great part of wounds and deaths due to external causes in Brazil, being also responsible for a big number of absence from work and functional and aesthetic sequelae, mainly among male population [1].

It is estimated that, in Brazil, 1,000,000 burn accidents occur per year. Of those, 100,000 patients will look for hospital attendance and 2,500 will die direct or indirect due to their wounds [2].

Problem Based Learning (PBL) was first introduced in the Canadian McMaster University Sciences of Health teaching, in 1969. The pedagogic proposition consists in a student-centered teaching based in solving real or simulated problems. To solve these problems, students use previous knowledge, developing together a brainstorm to then, debate, study, acquire and integrate new knowledge [3].

This integration, together with the practical application, facilitates the retention of knowledge. The PBL valorize besides the content to be learned, the form of learning, reinforcing the active role of each student in this process, allowing them learning to learn [3].

The proposals on how to operationalize this method run into great challenges; therefore, many institutions, such as the Federal University of São Carlos - UFSCar, divide the module "Situation Problem" in two periods: Provisional Synthesis and New Synthesis.

At first moment, Provisional Synthesis, the problem is discussed in group then hypothesis and questions are formulated. In a second

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moment, New Synthesis, after databases research, access to laboratories and consultancies with specialists; the students have a new encounter to discuss again the previous problem, but know, in the light of new knowledge.

In such a way, the student leave his position of passive-listener to become a problem-solver and protagonist of their own knowledge construction, seizing in this journey their difficulties and deficiencies to, in a second moment, try to solve them.

Based on such methodology, in this article, the chosen trigger was the case of a medium burn patient, internee in a general hospital with no experience in attending this kind of wound, what had showed to be an "ideal situation" to apply PBL and to construct students' knowledge, because they would have to look for all information to attend accurately the patient, and once the institution had no experience and neither protocols for such situation, providing to be a great challenge.

Objective

To describe, through a case report of burn care patient, in a non-specialized center, all the steps in teaching-learning process developed by interns of the medical course of Federal University of São Carlos – UFSCar.

Material and Method

It was used as a trigger for the students the care of a medium burned patient, transferred to the general hospital in the city of São Carlos, Brazil, institution after first attendance in a neighboring county, Brotas, Brazil. All the procedures were performed within the ethical protocols of institution and with the free and informed consent of the patient and his relatives.

The insertion of the interns in the care and follow-up of the patient followed all the norms of ethical conduct determined by the Code of Medical Ethics recommended by the Federal Medical Council and were always accompanied by a properly qualified preceptor.

The students sought as knowledge base, data already consecrated in the literary compendiums about burn patient care, such as: Sabiston Textbook of Surgery [4] e Schwartz's Principles of Surgery [5].

Besides the books, were also consulted protocols of burn patient care from Brazilian Health Minister: Handbook for the Treatment of Emergency Burn [6], Guidelines of the Brazilian Society of Plastic Surgery [7] and Advanced Trauma Life Support – ATLS® [8].

To update the inherent conducts of wound management, the students performed a systematic literature review of the main databases, getting results only from the electronic database of the National Library of Medicine (Medline). The "keywords" used were burn, wound, management. As inclusion criteria, articles with adult patients that were fully available in a period of publication between 2006 and 2016 and that corresponded to clinical trials or systematic review with metanalysis were adopted.

After such surveys, the students, together with the specialized doctor, analyzed all the conducts previously patient transference and in the light of all the knowledge acquired with the systematic literature review about burn patient care, and considering the existing limitations in the hospital for not being specialized, outlined an ideal treatment plan to that patient until its discharge, as very well demons-

trated in the reported case. The patient presented an unmistakable improvement at her clinical situation after the application of all the know-how acquired in the literature by the students.

This performance of the students made the conduct and decisions on the best treatment to the patient, always be within the recommended in the most current and advanced in the care of patients burned, even with the structural limitations of a general hospital, leading the case to a favorable outcome.

Case

MCT, 46 years, single, born and coming from Brotas, Brazil, history of burn injuries on lower limbs due to fire 6 days before hospitalization. She refers that the gas hose was broken and with the opening of the oven it occurred combustion of the gas in the environment that burned her dresses and caused the burns.

Patient admitted at general hospital in the city of São Carlos, Brazil, in 09/18/2016, 6 days after hospitalization in a health center at Brotas city, where she was being followed by a non-specialized professional.

On admission, the patient presented a mixed second degree burn on approximately 16% of body surface, concentrated on both low limbs as shown in Figures 1 and 2.

As comorbidities, she presented diabetes type 2 in use of metformin, arterial hypertension in use of losartan potassium and smoking of approximately 30 years/pack.



Figure 1: Mixed second degree burn on lower limbs with six days of evolution without specialized care.



Figure 2: Second degree burn on posterior region of left limb.

Patient came from the service of origin using antibiotic therapy with ceftriaxone 1000 mg twice a day via intravenous and analgesia with tramadol 100mg twice daily via intravenous, in addition to

simple occlusive dressing in lower limbs.

During her first day of hospitalization, she presented left leukocytosis (17200 leukocytes / mm³ and 6% rods). Afterwards, the patient was evaluated by a specialist in plastic surgery with the adequacy of the ducts and therapeutics.

Antibiotic therapy was adjusted to the hospital microbiota and to the patient's clinical condition (ciprofloxacin 400 mg associated with vancomycin 1000 mg twice daily via intravenous), antipruritic drugs were introduced with optimization of analgesia and hydration. Due to the characteristics of the wounds, the surgical debridement was indicated.

Surgical debridement happened on 09/21/2016, on the third day of hospitalization, eight days after the accident, with subsequent use of dressings in 4 layers (Rayon® with silver sulfadiazine, roller gauze, hydrophilic cotton and crepe bandage), with good clinical wounds evolution as presented on Figure 3.



Figure 3: Sixth day after surgical debridement with Blair Dermotome. Lower limb wound with good epithelization of the larger areas with some areas with loose fibrin.

After the third post operative day, hydrocolloid plates were used with silver for 2 days, and sequentially, the patient returned to the 4-layer dressing, but with a mixture of silver sulfadiazine and 10% papain ("papasulfa"). The dressing was daily changed according to technique described in literature, with good evolution of the reepithelization process of the wounds, Figures 4, 5 and 6.



Figure 4: Eighth day after surgical debridement and use of occlusive dressing in 4 layers with good, reepithelization in the largest areas.



Figure 5: Twelfth day after surgical debridement and use of dressing in four layers with wounds already epithelialized and small area of fibrin in right lower limb.



Figure 6: Aspect of the lesions after twenty days of evolution

Results

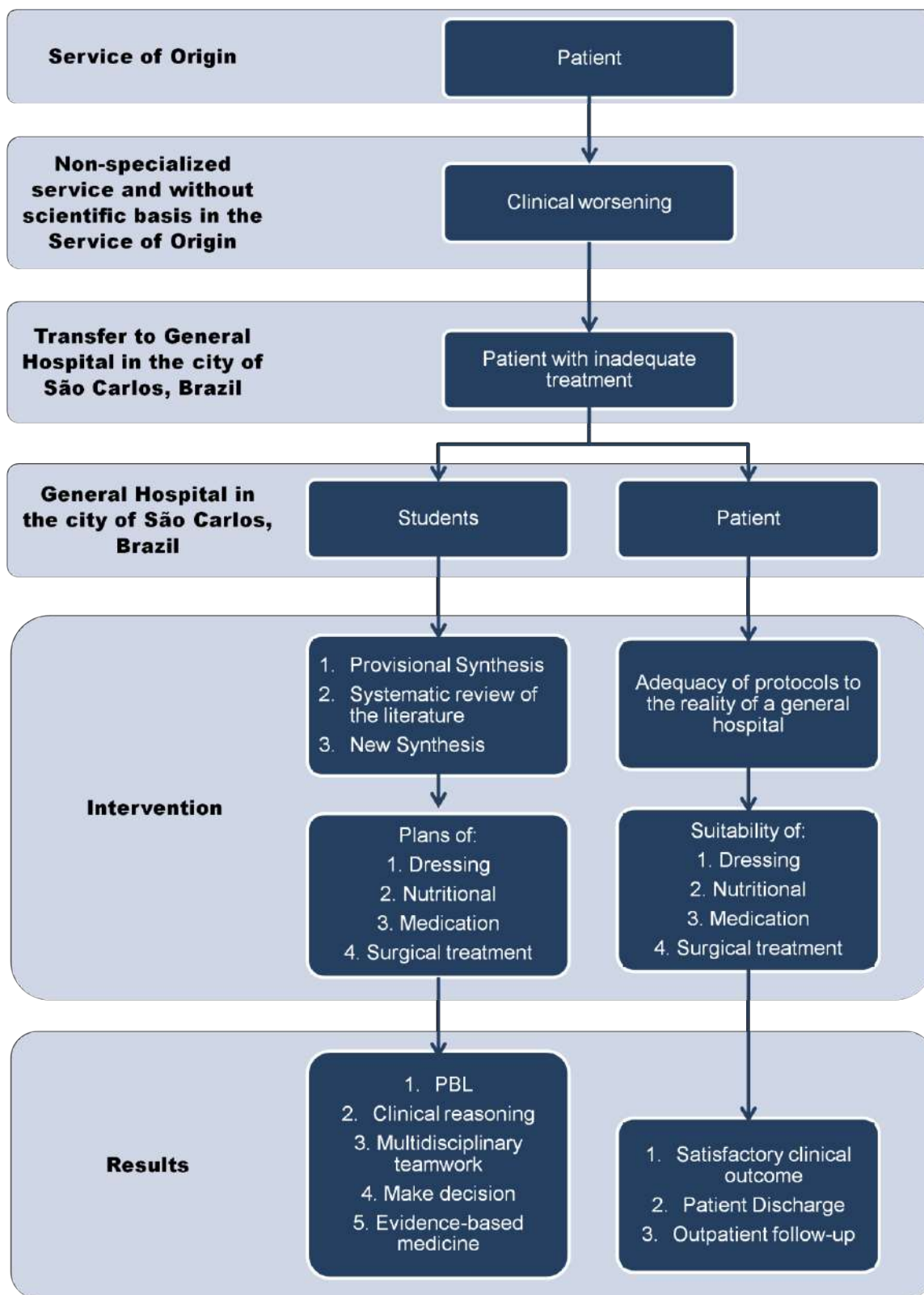
Stages of the teaching-learning process followed by students in the active learning methodology are summarized in Flowchart 1.

According to Flowchart 1, it is observed that the patient was admitted with 6 days of flaming burn in lower limbs. She presented wounds with bedsores and signs of infection, despite the use of systemic antibiotic therapy, denoting inadequate and unspecialized care from the source service.

She started follow-up with the plastic surgery specialist in her first day of hospitalization in our service, with the adequacy of the conducts according to protocols for attending burns [6], fruits of the systematic literature review, made by the students, as a strategy for actively seeking knowledge. A 4-layer dressing was performed, the antibiotic therapy regimen was changed and infectious screening was promoted, and the only change was left leukocytosis (17,200 leukocytes / mm³ and 6% rods).

On the 3rd day of hospitalization, the surgical debridement of the wounds was performed and intra-operative cultures were collected with the removal of 1.0 grams of tissue from the wounds. After growth time, the culture result was negative, but clinically the aspect of the wounds improved with the new antibiotic therapy scheme, as well as the serum leukocytosis, thus, the therapy was maintained.

In the immediate post operative period, 4-layer dressing was done. On the second post operative day, new serum exams were



Flowchart 1. Stages of the teaching-learning process, 2017, São Carlos, Brazil.

recorded demonstrating the resolution of leukocytosis (leukocytes $7,700 / \text{mm}^3$), with the remainder of the exams without abnormalities.

On the 5th postoperative day, a 4-layer dressing was used, with the use of papain 10% with sulfadiazine, because there was thick fibrin in the wounds and, because how it was not a specialized center for burns, the nursing team had difficulties in the dressing changes, thus a chemical agent with greater debridement power was required for the granulation process.

With the students' learning in the literature data, in addition to antibiotic therapy and dressings performed, were also maintained throughout the hospitalization period, antipruritic drugs, optimized analgesia and intravenous hydration with maintenance of electrolytes and nutrition with a hypercaloric and hyperprotein diet, following protocols of literature for the treatment of burns [6,7].

After 21 days from the accident, 15 days of implementation of therapeutic plan created by the students together with the specialist doctor and 12^o post-operative, with satisfactory evolution, reaching total reepithelialization of the wounds [Figure 5], normal laboratory parameters and with 14 complete days of antibiotic therapy, the patient was discharged for outpatient follow-up, without any sequelae and without the need for partial skin grafting, not even in the deep second-degree areas [Figure 6].

The students and facilitator, during Provisional Synthesis reunion, highlighted the importance of adequate care of a critical burn patient in a general hospital, to reduce morbidity and mortality. They emphasized how much knowledge the students were able to absorb, and how their work with the care team, bringing the newest data in the literature on burn care and collaborating in decision making, contributed to change the patient's evolution, giving the case a great outcome without any sequel, even with all the limitations of a general hospital.

As a result of systematic literature review, the students highlighted 18 publications, of which seven were selected according to their relevance to the proposed study [9-14]. A systematic review of the Cochrane database [15] was also used.

Discussion

According to recommended advices for the initial care of the burn victim patient, the initial measures aim at the clinical stabilization of the patient and the simple coverage of the wounds with dry and sterile dressings allied to the treatment for pain and transfer of the patient to specialized care within the first 24 hours after clinical stabilization [8, 18].

On literature, it is observed that medium and critical burn patients that are treated out of specialized centers, presents bigger rates of mortality and sequelae, increasing the costs to health public system and less quality of life to the victims [19].

It is observed that the initial care given to the patient did not follow the recommendations in the literature, once in this reported case, the patient received initial care with simple occlusive dressings with silver sulfadiazine and was transfer to specialized care after 6 days of evolution and not in the first 24 hours after the trauma.

After initiation of specialized care based on the current protocols recommended [6-15, 18], under the guidance of a specialist in plastic

surgery, it was instituted the treatment with adequate antibiotic therapy, analgesia, hydration, nutrition, surgical approach and dressings, with evident clinical improvement of the patient.

The relevant difference between the treatment given to the patient of the case reported above in the medical service without formal protocols or specialized team in the care of the burn victim, and its subsequent management under the guidance of a specialist in plastic surgery, with an evident prognostic alteration, contributed to a greater awakening of student interest and thus to develop a detailed search for knowledge.

This sense of co-responsibility was justified by the need for team training, because the burned patient, for his correct treatment, depends on the performance of a multidisciplinary team, which did not have this knowledge and had to be guided by the information brought by the students.

Understanding the tools available in the literature, conditioning them to the reality of learning, frames as an optimizing agent of the teaching-learning process. It is not about momentary and passive knowledge, but of experiences that transform professionals because they are inserted in every process, actively participating in its evolution, errors and successes.

In addition, it is possible to deal with factors external to patient care such as family and team yearnings, handle intercurrents, live expectations and realities in the care process, among other aspects that are not taught in books or classes. This perception demonstrates the great potential of student's early insertion in clinical practice, when properly accompanied by a specialized professional [19].

The traditional teaching methodologies are based on the transfer of knowledge from the holder to the non-holder, that is, from the teacher to the student vertically. The knowledge is fragmented in disciplines, where didactics is not always a strong point. The integration of knowledge becomes very difficult, often late, occurring only in practical internship activities [19].

The replacement of fragmented knowledge, offered in disciplines, by real situations, involving several aspects of knowledge, favors a meaningful and contextual learning and also promotes the integration of curricular contents of the basic and clinical cycles. Moreover, it favors the insertion of the students in clinical practice activity at the beginning of the medical course and their contact to other specialties – multidisciplinary team, greatly expanding their skills and competences.

The PBL favors the development of communication skills for working in small groups, exposition of ideas, capacity for argument and criticism. Respect to different opinions, self-criticism, a sense of responsibility, the ability to manage projects and the activities of a working group are also important gains [3].

Conclusion

The described case of care of a medium burned patient in a general hospital fulfilled its goal of triggering the search for knowledge, successfully enhancing both teaching and care; developed student's clinical reasoning, the decision making, multidisciplinary teamwork and the use of evidence-based medicine, summarizing the active learning methodology.

All process of the case reported as well as the acquisition of knowledge was carried out in an active way, with theoretical and

practical participation of the students. The formulations of hypotheses and questions served to fill the knowledge gaps encountered. The difficulties due to the lack of knowledge, because it is not a reference hospital to the care of burned patients, have become the main triggers in the search for knowledge to then, perform the best possible care to the patient.

Even though it is a general hospital, where there are not all the necessary and recommended resources available to the treatment of a burned patient, the care of this patient in the light of the evidence-based medicine, culminated in satisfactory results: time of healing, infection control, and outcome without patient sequelae.

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