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Research Article

A Collaborative Project to Bridging the Gap between Basic and Clinical Teachers: The Opinion of Medical Students

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The organization of medical curricula with a clear distinction between basic and clinical subjects makes it difficult for teachers to collaborate and teach students in an integrated way. We designed a new subject, *Integrated Medicine*, to overcome such limitations. Here, we describe the evaluation of the first three years of running the experience, as well as the opinion of the first group of students in their sixth year. Three cohorts of first-year medical students ($n = 158$) and eight teachers, as well as a group of students of sixth year ($n = 41$), participated in the experiment. Students worked following the problem-based learning approach. Their satisfaction, their subjective improvement of content knowledge in basic and clinical fields, and their belief about the accomplishment of educational objectives were evaluated. The results showed a high level of satisfaction, increased content knowledge, and improvement in solving problems, searching for relevant information, team working, and oral and written communication skills. Students of sixth year agreed that the subject helped them to better understand the clinical manifestations of disease, the diagnosis process, and therapeutic approaches. In conclusion, experiences such as *Integrated Medicine* may enhance the integration of knowledge by the joint work of basic and clinical teachers.

1. Introduction

Medical curricula had been traditionally organized with individual, basic science courses followed by clinical science courses and clinical clerkships [1]. However, medical students may have difficulties in appreciating how the basic disciplines help them better understand the pathophysiology and treatment of diseases. Therefore, the need to more fully integrated basic science teaching in all medical curriculums by means of new educational innovations has been suggested [2]. Nevertheless, sometimes it may be arduous to allow the fact that the increasing knowledge of biological sciences may be incorporated into clinical sciences [3]. In this way of thinking several experiences have recently been described [4–6]. In the last two decades one of the most popular experiences has been the implementation of integrated curricula [7]. However, this teaching option is not easy to accomplish. Rangachari has used the term of the "Holy Grail of Integrated Curriculum" to outline how difficult it may be to adequately apply its principles [8].

Integrating a curriculum is a complex process and poses important challenges to the stakeholders in the process. Several elements need to be considered: interdisciplinary teaching, interdisciplinary collaboration, building curricular links, and sequencing and framing curricular content [9]. Probably, the first two points are especially important. Interdisciplinary teaching collaboration is essential, as the academic divorce between basic and clinical teachers worsens the perception

of students concerning the utility of basic sciences for their future clinical practice. Thus, the search for an intermediate path seems to be a reasonable alternative. In Spain, and probably in other European countries, strong tradition is an important obstacle to bring about profound changes in the short term. Hence, the implementation of initiatives that may act as a bridge between traditional curricula and the new, integrated models may be helpful for those trying to progress on the teaching innovation path.

In 2008, we started a new medical curriculum based upon four main principles: a strong emphasis in basic sciences, clinical education based on the problem-solving method, consideration of the biopsychosocial model, and an insight into the humanistic side of medicine [10]. In this paper we reported our experience in the definition of new subjects designed to enhance the collaboration of basic and clinical teachers.

2. Material and Methods

2.1. The Setting. The survey was administered to students of the first year of the Bachelor's degree of Medicine, offered jointly by the Universitat Pompeu Fabra (UPF) and the Universitat Autònoma de Barcelona (UAB). This is six-year-long curriculum and includes several differences, when compared with the traditional Spanish ones. One of these is the existence of a new subject called Integrated Medicine. This survey considers first-year students who followed the subject during the first three academic years (from 2008 to 2011).

2.2. The Students. In Spain, most medical students come straight out of high school and, therefore, they have similar training. In order to enter the university, they must pass a national-based exam and, as medical studies are in great demand, only those with the best marks will be accepted to medical schools.

2.3. The Teachers. We recruited eight teachers from among those interested in participating in the experience, all of them with medical training as MDs. The goal was to obtain a sample of those that had participated in the past in teaching basic or clinical subjects. The coordinators of the project were a pharmacologist (Josep-E. Baños) and an internist (Ramon Miralles), and the remaining members of the team were a clinical biochemist (Mariano Sentí), a clinical pharmacologist (Joan Bigorra), one anesthesiologist (Enric Samsó), two surgeons (Meritxell Girvent, Joan Minguella), and one intensive care specialist (José-F. Solsona). The main functions of the coordinators were to write the scenarios, assign the tutors to each group, introduce the subject to the students, answer their queries, solve any problem that appeared during the course, and agree with the tutors about every organizational aspect. They also prepared the material for the final assessments and gave the grades of every student, once evaluated by the tutor of his or her group. The other members of the group discussed the scenarios and the educational objectives of each of them, acted as tutors as well, and helped to prepare the final assessments in a coordinated way. Their text needed full consensus by all members of the group.

The main idea that tutors considered when preparing the texts was to introduce a clinical problem to be solved by applying the principles of basic medical sciences to students that have no previous training in any of those principles. The objective was to enhance the acquisition of concepts in both areas to be applied in order to understand clinical issues to outline the importance of basic science to understand clinical problems and to introduce the latter with the help of the former.

Teachers met before the beginning of the course to agree upon the objectives of the subject, the scenarios and the method of evaluation. All of them were tutors for at least one year and also met every year to review the cases and to introduce any change in the text that was agreed upon.

2.4. The Design of the Course. Integrated Medicine is given for one trimester in the first four years of the curriculum. It consists of a ten-week course that follows the pedagogic model of the problem-based learning (PBL) approach. Students are exposed to the PBL approach for the first time in this subject, and this method is no longer used in the remaining curriculum. In brief, students were divided into groups of ten members under the supervision of a tutor for the entire period. They tackled four problems during this period, devoting two weeks to each of them and three in the last. In the tenth week a wrap-up session permitted them to solve the unattended topics and any doubt about the problems that still remained.

Teachers agreed upon the four different clinical scenarios used in the subject. The main reason for making the choices was the high prevalence of the health problems considered in each of them, the relationship with important concepts of the basic sciences (anatomy, physiology, biology, epidemiology, pharmacology, and pathology), and the existence of a clear pathophysiological link between the clinical picture and basic knowledge. Following these criteria, the first was devoted to introducing the health problem of an elderly man with respiratory failure. The text with its educational objectives is shown in Appendix A. The second was an elderly woman with exercise-related chest pain, breathlessness, and hypertension. The third considered a young boy who presented a convulsive state, and the fourth was related to *H. pylori* and its ability to produce peptic ulcers.

Coordinators wrote the first draft of every case. Once the content had been agreed upon, the case was sent to the other tutors for their comments. When everyone agreed, cases were modified accordingly. When the course was over, a meeting of all tutors was held to analyze how the course went and to make additional changes if needed.

2.5. The Sequence of the Course. In the first tutorial session, tutors introduced his/her group to each scenario, asked students to identify the relevant points of each one, and stimulated them to elaborate the best questions to solve the scenario and to remark those which seemed the more important to each student. Each tutorial session was extended

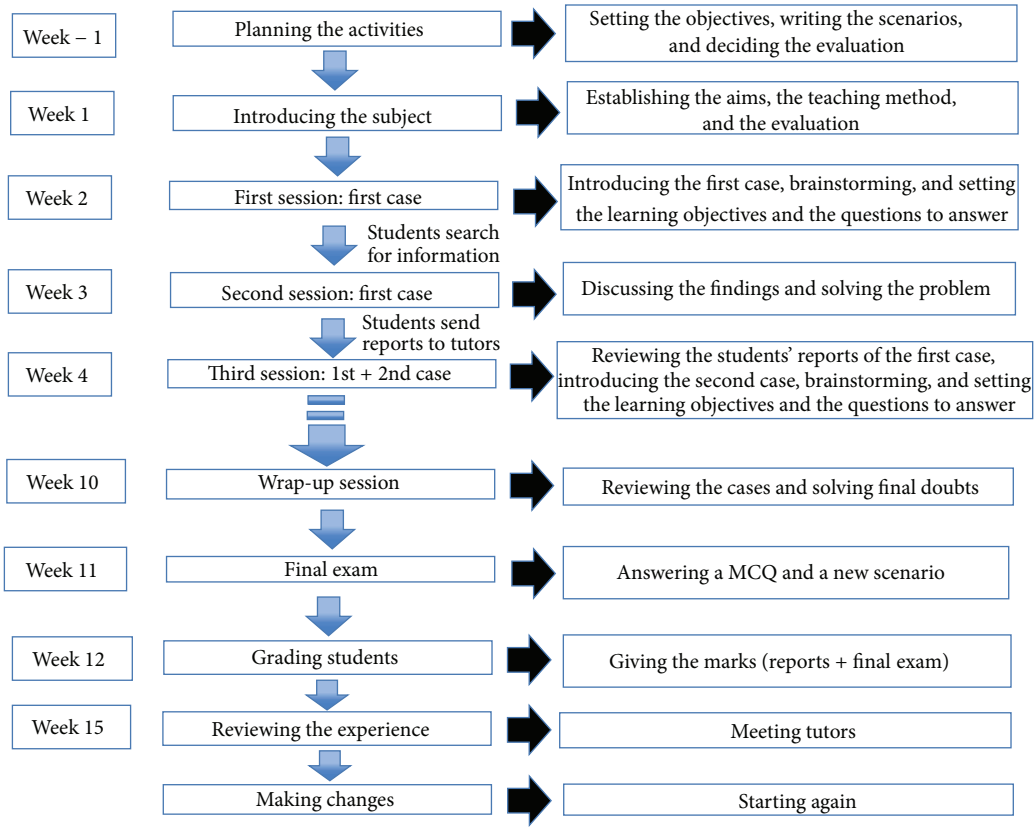

Figure 1: The flow chart describes the main steps of *Integrated Medicine*. Between Week 4 and Week 10, the second, third, and fourth cases were treated in the same way as described in Weeks 2–4 and, therefore, the information was not included in the figure. MCQ = multiple-choice questionnaire.

up to a maximum duration of 2 h. Figure 1 shows a flow chart of the process.

Students were assessed in several ways. The first step considered students' assignments (two individual, written assignments; one written assignment by each group of students; and one oral presentation by each group of students). The teacher reviewed each of these written assignments and then gave feedback to each student. In the oral presentation, the tutor analyzed both the correctness of the material and the way in which the information was presented. These activities represented 40% of the total grade. All students completed a criterion-referenced assessment at the end of the academic year. This assessment gave the remaining 60% of the final grade (40% came from a multiple-choice questionnaire and the remaining 20% from the resolution of a new scenario).

2.6. The Evaluation of the Experience. Two evaluations were performed. The first considered the opinion of first-year students. In the last tutorial session before the final evaluation, students were asked to voluntarily and anonymously complete a questionnaire with three sets of questions (Appendix B). The first set considered the subjective opinion of the students about the subject. The second tried to learn how the subject had improved the knowledge of the students in some topics. The third tried to know if the students considered that the main objectives of the subject had been reached. The meaning of each question was explained and the tutors answered any doubt. Students also had the opportunity to include comments about the subject at the end of the questionnaire. The results are shown as the mean and standard deviation of the mean if otherwise not stated.

To ascertain how the activity may have influenced the training of the students during the clinical years, a second evaluation was carried out with sixth-year students of the first cohort that graduated in 2014. The questionnaire included five statements to be scored using an ordinal scale (1 = completely disagree; 2 = partially disagree; 3 = neither agree nor disagree; 4 = partially agree; 5 = completely agree), and they were asked their opinion of how Integrated Medicine helped them to better understand the clinical issues of their training. They were asked to complete the questionnaire voluntarily and anonymously after being informed of the objectives of the study.

2.7. Statistical Analysis. Data are shown as median (quartile 25, quartile 75) when ordinal scales were used to analyze the agreement with statements. Otherwise, mean ± standard deviation was used. In order to control the degree of concordance we conducted a preliminary statistical analysis on the scores among the six groups of students in each academic

Table 1: Scores given by the students regarding their degree of agreement with the statements devoted to analyzing their satisfaction with the teaching, the improvement of generic abilities, and the basic characteristics of the subject [1: I strongly disagree; 2: I partially disagree; 3: I neither disagree nor agree; 4: I partially agree; 5: I strongly agree]. Data are shown as median (quartile 25, quartile 75).

Number	Statement	2008-09	2009-10	2010-11	Total
1	I am satisfied with the teaching of the subject	5 (5,5)	5 (4,5)	5 (4,5)	5 (4,5)
2	The tutors have contributed to improving my learning	5 (4,5)	5 (4,5)	5 (4,5)	5 (4,5)
3	The self-work has been adequate	5 (4,5)	4 (4,5)	4 (4,5)	4 (4,5)
4	I have improved my analytic ability to solve problems	4 (4,5)	4 (4,5)	4 (4,5)	4 (4,5)
5	I have improved my ability of oral communication	4 (3,4)	3 (3,4)	3.5 (3,4)	3 (3,4)
6	I have improved my ability of written communication	4 (4,5)	4 (3,4)	4 (4,5)	4 (3,4)
7	I have improved my ability of searching for information	5 (4,5)	4 (4,5)	4 (4,5)	4 (4,5)
8	I have improved my teamwork ability	4 (3,5)	4 (3,5)	4 (3,4)	4 (3,4)
9	The evaluation of the subject was adequate	4 (3,5)	4 (4,5)	4 (4,5)	4 (4,5)
10	The time devoted to the subject was adequate	4 (4,5)	4 (4,5)	4 (4,5)	4 (4,5)

Table 2: Scores given by the students as to their perception of improvement of knowledge with ten topics that were considered in the cases used in tutorials (1 = minimum, 10 = maximum). Values are shown as mean ± SD.

Number	How do you score the improvement in the knowledge of the following topics?	2008-09	2009-10	2010-11	Total
1	Anatomy and physiology of the respiratory system	7.15 ± 1.35	7.35 ± 1.64	7.94 ± 1.42	7.46 ± 1.51
2	Anatomy and physiology of the cardio-circulatory system	7.40 ± 1.42	7.69 ± 1.58	8.08 ± 1.13	7.72 ± 1.41
3	Anatomy and physiology of the nervous system	6.27 ± 1.65	6.36 ± 2.12	7.25 ± 1.77	6.60 ± 1.91
4	Anatomy and physiology of the stomach	7.29 ± 1.67	7.88 ± 1.66	7.69 ± 1.53	7.63 ± 1.64
5	Risk factors and their contribution to disease	7.38 ± 1.36	7.50 ± 1.58	7.81 ± 1.79	7.57 ± 1.57
6	Pathophysiology of respiratory failure	7.60 ± 1.44	8.46 ± 1.48	8.10 ± 1.40	8.07 ± 1.37
7	Pathophysiology of cardiac failure	7.48 ± 1.38	8.29 ± 1.43	8.35 ± 1.21	8.05 ± 1.40
8	Pathophysiology of hypertension	7.54 ± 1.38	8.03 ± 1.46	8.21 ± 1.20	7.92 ± 1.38
9	Pathophysiology of epilepsy	6.85 ± 1.71	7.36 ± 1.85	7.88 ± 1.44	7.35 ± 1.73
10	Pathophysiology of peptic ulcers	7.12 ± 1.60	7.96 ± 1.54	7.94 ± 1.45	7.68 ± 1.58

year. At this respect, we used ANOVA and Tukey's post hoc test, and no significant differences were found.

3. Results

Three cohorts of freshmen students were studied. The sample size was 158 students, 52 in the first cohort (2008-2009), 58 in the second cohort (2009-2010), and 48 in the third cohort (2010-2011). Most of them were women (69.6%) and their age ranged from 18 to 57 (median = 19 years old). No significant differences were observed among cohorts in the distribution by sex or age. The single cohort of sixth-year students (40) represented the first batch of students who took the course in 2008-2009. In the criterion-based assessment, all students of the first cohort (A+: 3.6%; A: 5.5%; B: 85.5%; C: 3.6%) and the second cohort (A+: 5.1%; A: 5.1%; B: 74.6%; C: 74.6%) and most of the third score (A+: 5.2%; A: 1.7%; B: 77.6%; C: 8.6%, D: 1.7) passed the cutscore.

Table 1 shows the scores given by the participants to the first set of statements. As can be seen, differences among cohorts were minimal and only appeared in the statements related to oral communication, self-working abilities, and ability to search for information. Otherwise, the medians were identical, showing that the level of satisfaction with the main aspects of the subjects was high. Therefore, we consider that scores were stable in the three years during which the experience was evaluated.

Table 2 considers the subjective degree of the improving of several topics that were the core of the different cases during the tutorials. Scores increased over the period, and most of them were higher in the third, rather than in the first and second years. In the total scores, values ranged from 6.60 (*anatomy and physiology of the nervous system*) to 8.07 (*pathophysiology of respiratory failure*).

Table 3: Scores given by the students concerning their perception of accomplishment of the main educational objectives related to the subject (1 = minimum, 10 = maximum). Values are shown as mean ± SD.

Number	How do you score the accomplishment of the following educational objectives?	2008-09	2009-10	2010-11	Total
1	The integration of the basic and clinical knowledge in a common context	7.67 ± 1.37	8.10 ± 1.41	8.11 ± 1.18	7.96 ± 1.34
2	The relationship among physiology, pathophysiology and clinical medicine	7.71 ± 1.24	8.09 ± 1.85	8.21 ± 1.03	8 ± 1.22
3	The integrated thinking of clinical cases	7.88 ± 1.45	8.05 ± 1.47	8.23 ± 0.99	8.05 ± 1.34
4	The adequate search for relevant information and the critical reading of the biomedical literature	7.58 ± 1.52	7.90 ± 1.57	7.83 ± 1.36	7.77 ± 1.49

Table 4: Results of the questionnaire filled out by students of the 6th year regarding their opinions about the subject of *Integrated Medicine* (n = 40) [1: I strongly disagree; 2: I partially disagree; 3: I neither disagree nor agree; 4: I partially agree; 5: I strongly agree].

	1	2	3	4	5	Median value and quartiles
Working together in the tutorial groups of *Integrated Medicine* enhanced my learning.	—	1 (2.5%)	8 (20%)	22 (55%)	9 (22.5%)	4 (4,4)
The concepts of basic sciences learned in Integrated Medicine helped me to more easily understand the clinical manifestations of disease.	—	—	6 (15%)	30 (75%)	4 (10%)	4 (4,4)
The concepts of basic sciences learned in Integrated Medicine helped me to improve my understanding of diagnosis processes.	—	—	13 (32.5%)	22 (55%)	5 (12.5%)	4 (3,4)
The concepts of basic sciences learned in Integrated Medicine helped me to improve my understanding of therapeutics.	—	3 (7.5%)	13 (32.5%)	19 (47.5%)	5 (12.5%)	4 (3,4)
Integrated Medicine helped me to have a broader knowledge of diseases and patient care.	—	6 (15%)	9 (22.5%)	14 (35%)	11 (27.5%)	4 (3,5)

Table 3 summarizes the scores regarding the accomplishment of the main educational objectives of the subject. All of them have mean-score values in each cohort higher than 7.50. In the three cohorts, mean values of the scores were all in a small range (less than 0.4). Differences in total values were even smaller.

Table 4 shows the results of the questions that the sixth-year students answered. The median value in all cases was "partially agree". In the questions that were focused on how Integrated Medicine helped them to improve their learning in clinical issues, most students answered "partially agree" or "completely agree," such as in helping to understand the clinical manifestations of disease (85%), improving of the diagnosis process (67.5%), and understanding of therapeutics (60%).

4. Discussion

The results are reported herein of one experiment using integrated cases of clinical scenarios that need basic medical sciences to be understood by medical students in their first year at the school. They show that students felt that the subject was useful to improve their generic abilities and their knowledge in basic and clinical issues and to understand clinical scenarios using anatomy or physiology, for example. This improvement was still felt by students finishing their medical studies.

In the last few years, several authors have suggested the interest of attenuating the classical differences between the first years of medical studies, devoted mainly to learning basic medical subjects, and the last ones, concerned with clinical training [11–15]. The best way to achieve this objective is curricular integration, which has been defined as the use of interdisciplinary block courses in preclerkship years that bring together basic, clinical, and social sciences into one course, or weave longitudinal curricular themes across the curriculum [16]. The reasons for this approach are multiple and include the need to improve the link among subjects, the need of some continuity across the first and the last years, and the benefit of increasing motivation early-on in

medical training. Several strategies can be used with this objective in mind, such as full, integrated curricula, the enhancement of early contact with clinical practice, or the implementation of specific activities to make this possible. Probably the first of them is the most appropriate, as students are exposed to clinical knowledge just after entering medical school, but in some universities this option is difficult to consider, as traditional cultures in some medical teachers are against the feeling of losing "academic power," as traditional subjects dilute themselves into broad ones that are organized according to specific scenarios rather than those that are discipline-based. This might impede the organization of curricula in the integrated way, since resistance to change can win the battle in the end. The second option, early clinical contact, is an option that could be implemented without serious resistance in most centers, and literature on medical education is full of successful examples [17–20]. We also have some experience in this possibility, which we started with our students four years ago with positive results that have been described elsewhere [10]. The third one, the introduction of specific activities, is also an interesting experience that merits further exploration, and some examples can also be found in the medical literature [21]. In fact, the use of clinical scenarios has been recommended to introduce basic science concepts and to permit medical students to have a better understanding [22].

PBL was chosen because this method has been shown to enhance the cognitive process of integrative knowledge in medical students [11, 14, 23, 24]. Our results show that they considered this objective to be reasonably achieved and that they also received significant knowledge in specific topics. This was an important fact, as they were in their first year at the university and some problems might be expected with this sudden immersion in the clinical field. However, this does not appear to be a problem for most students. Appendix C summarizes some free comments of students.

Final evaluations at the end of the trimester, as well as the regular reports, were considered to be very positive by tutors (data not shown). They also considered that the subject permitted them to grasp basic and clinical aspects of medicine together, an important aim of Integrated Medicine. When separating clinical and basic topics, their degree of knowledge gain was higher in the first than in the second. This is an important point, as the subject tried to show how basic sciences are important in order to understand the clinical field. There are several explanations for this finding. First, problems were written out to outline a clinical problem and tutors may not have been able enough to help students to focus on the important topics of basic biomedical sciences. This is a reasonable possibility and we are now trying to refine the texts of each problem, especially the one that considered the nervous system, since this was the worst scored in both years. However, alternative hypotheses are also feasible. For instance, questions in the evaluation form asked for "improvement in knowledge" and students already had basic knowledge in organic systems, as most of them had followed previous courses of general biology. This risk should be borne in mind when writing out the cases, since medical students may easily have a biased interest of clinical issues rather than focus their attention on searching for anatomy or physiology concepts. On the other hand, some students consider that the topics were treated in-depth. For instance, one of them, now in her fourth year, wrote us: "In no other subject have we approached some diseases in so broad a manner, such as cardiac failure or diabetes mellitus." This belief persisted across time, as sixth-year students still felt that the subject help them to better understand the disease process, including clinical manifestations, diagnosis, and therapeutics.

The choice of clinical scenarios merits some comment. We have followed the suggestion of Neville and Norman [14], who have suggested the use of health problems of high prevalence, clinical logic, prototypical value, and interdisciplinary learning potential. This was the reason for considering hypertension, myocardial ischemia, cardiac failure, chronic respiratory disease, peptic ulcers, and epilepsy. We also followed the recommendation of selecting more focused and shorter cases, which enabled the students to not have to consider too many objectives at the same time [14], especially when the hybrid model was used. The vertical integration between basic sciences and clinical medicine may help to have a better understanding of biomedical principles than do traditional curricula [25], and we hope that our students will have this advantage in the future. In fact, it has been widely shown that the case-based approach effectively promotes integration among basic, clinical, and social sciences and that clinical contexts, such as those used in Integrated Medicine, may be fundamental to successful integration [16, 26–28]. It has been stated that the progress from basic sciences to clinical years may require that students shift the processes of understanding and explain clinical findings in terms of basic sciences to those acquiring and interpreting clinical findings in order to diagnose and manage patient problems [21]. We believe that the logic of clinical medicine may be initially improved in the early years with the integrated approach, and the way to clinical thinking should be smoothed out as the continuity between basic knowledge and clinical clerkships is minimally assured [29].

Another aspect to consider is the value of the answers of students to the last four questions, that is, those related to the accomplishment of educational objectives (see Table 3). It can be argued that students are not mature enough to consider these apparently complex concepts. However, their opinion of how basic and clinical knowledge may be used to solve problems is a good clue in the way to accept the appropriateness of the subject. Tutors who reviewed the students' reports of each case confirmed that they were using references from basic and clinical fields, which helps to maintain the idea that the use of both is needed to understand the cases.

We believe that the best aspect of the experience was the successful collaboration of basic and clinical teachers in a project of educational integration. This is highly significant as traditional teaching roles (i.e., a clear-cut separation of basic and clinical subjects taught by completely different teachers) might hinder the possibility of adequate collaboration and make the design of the activities troublesome. For instance, biochemists may not be completely aware of the content of their subject that is needed for understanding diseases.

On the contrary, endocrinologists may find most biochemistry that medical students learn in the preclinical period irrelevant. We have tried to avoid such a gap by creating clinical scenarios, provided by clinicians, which need basic knowledge to be scientifically understood. Following this approach, basic scientists also feel at ease if the objectives of acquiring knowledge in their subjects are also assured. To gain such a consensus, both of them should participate in the design of the scenarios, the supervision of tutorials, and the evaluation process. We deeply believe that the creation of such common grounds might help to establish the principles of confidence that would enhance new steps of integration in the future. Sharing every step of the process may avoid any feeling of imposition of clinical over basic teachers or vice versa. As Rangachari [30] wrote, "the principles of pharmacology can be better appreciated by medical students when placed in a clinical context." We fully agree with this statement applied to other basic sciences after teaching Integrated Medicine for the last six years.

A potential limitation of the study is that results are only based on self-assessment. However, even when self-assessment does not always provide objective information, there is some evidence that it is more reliable than asking experts or colleagues [31]. Given the exploratory nature, the results may be considerably reliable for the final objective of the study. Another limitation is that our findings are from a single institution and should not be generalized to other schools. It must also be emphasized that the first part of this study was performed in the first three years of the new curriculum and changes will probably be introduced to improve it in the future. Nevertheless, data were consistent across the years and reinforced the interest of following this educational approach. Additionally, the absence of control students who did not participate in the new subject prevented a proper evaluation of the influence of the subject matter in the progression of student confidence for some features of clinical reasoning, as has happened in other studies [21]. Nevertheless, our data allow for getting information about student needs and improvement on critical issues and may help to establish better training and teaching during the clinical years. As shown by the opinion of sixth-year students, the effect of Integrated Medicine is perceived as long-lasting and may benefit training in this period.

5. Conclusion

We describe here a first-year course that integrates basic and clinical knowledge for medical students in a traditional European setting. This involved close collaboration between basic scientists and clinicians to permit students to recognize the relevance of basic sciences for dealing with clinical problems. The students who took this course had a positive experience. Though the course was taken only in the first year, it did appear to have an impact in later years. We believe that that approach might be useful when a certain degree of integration is desired in curricula with a more classical approach, especially in medical schools with a long, established, traditional way of teaching.

Appendices

A. An Example of a Clinical Scenario Used in Integrated Medicine (*The Breathlessness of Frankie*) with Its Educational Objectives

It is bad to become elderly, Frankie thought, when he saw the stairs of his home, At eighty-five, each time it was more difficult to arrive at his home on the first floor in Aragó street. When the breathlessness started, his general practitioner advised him to completely stop cigarettes. This was something difficult to follow, especially after fifty years of smoking two packs daily. He improved a little bit after successfully quitting tobacco, but he has now worsened and he is breathless even at rest. Sometimes, his lips have a bluish colour. His cough produces mucus that has changed its colour and is greenish instead of yellow, as always. He is a little feverish and feels a moderate pain at the bottom of his right thorax. His tiredness increases every day. He thinks that perhaps he should obey his wife and visit his physician again. But now, what is she going to ban him from doing? Maybe from reading the newspaper?

Educational Objectives

(1) To review the anatomy of human airways.

(2) To review the general physiology of breathing with special focus on gas exchanges.

(3) To learn how mucus is produced in the airways and the meaning of their change of colour.

(4) To learn the basic terminology of respiratory physiology and medicine (dyspnea, gas exchange, expectoration, chest pain, and cyanosis).

(5) To learn how physiological functions may deteriorate in elderly people.

(6) To learn the concepts of dyspnea and cyanosis and their pathophysiological substrates.

(7) To establish the relationship among smoking, environmental pollutants, and respiratory diseases.

(8) To learn the main diseases associated with smoking.

(9) To learn the main complications of chronic obstructive pulmonary diseases.

(10) To learn the main agents that may cause respiratory infections.

B. The Questionnaire Used in the Evaluation of *Integrated Medicine* in Students of First Year

The following questionnaire wishes to know your opinion on Integrated Medicine. The questionnaire is answered anonymously and your participation is voluntary. It will be used to know how the subject has worked and to establish improvements for the next academic years. Thank you for your help.

What is your opinion about the following sentences?

(1: strongly disagree; 2: partially disagree; 3: neither disagree nor agree; 4: partially agree; 5: strongly agree)

(1) I am satisfied with the teaching of the subject.
(2) The tutors have contributed to improving my learning.
(3) The self-work has been adequate.
(4) I have improved my analytic ability to solve problems.
(5) I have improved my ability of oral communication.
(6) I have improved my ability of written communication.
(7) I have improved my ability of searching for information.
(8) I have improved my teamwork ability.
(9) The evaluation of the subject was adequate.
(10) The time devoted to the subject was adequate.

How do you score your improvement in the knowledge of the following topics?

(1 = minimum, 10 = maximum)

(1) Anatomy and physiology of the respiratory system.
(2) Anatomy and physiology of the cardiocirculatory system.
(3) Anatomy and physiology of the nervous system.
(4) Anatomy and physiology of the stomach.
(5) Risk factors and their contribution to disease.
(6) Pathophysiology of respiratory failure.
(7) Pathophysiology of cardiac failure.
(8) Pathophysiology of hypertension.
(9) Pathophysiology of epilepsy.
(10) Pathophysiology of peptic ulcers.

How do you score the degree of accomplishment of the following objectives?

(1 = minimum, 10 = maximum)

(1) The integration of the basic and clinical knowledge in a common context.
(2) The relation among physiology, pathophysiology, and clinical medicine.
(3) The integrated thinking of clinical cases.
(4) The adequate search for relevant information and the critical reading of the biomedical literature.

C. Some Comments of Students regarding Integrated Medicine

(1) "Integrated Medicine I has brought us closer for the first time to patients and to the puzzle of signs and symptoms; to the new world of risk factors, medical terms, pathophysiology... and makes integration compulsory in order to understand the patient as a whole. To search for the whys and the wherefores, to organize ourselves and to work as a team, to find reliable information."

(2) "I believe that Integrated Medicine has given us the possibility of having a wide view of medicine, considering both biological and clinical aspects of the disease. In fact, it has given us the feeling of being 'physicians' from the first year on."

(3) "The best of Integrated Medicine is the meditation and the integration of concepts from physiology, pathophysiology, histology and others. Until now, in no subject have we considered diseases, such as cardiac failure or diabetes mellitus, in such an in-depth manner."

(4) "We had the opportunity of making contact with clinical medicine from the first year, and this has permitted us to have a critical grasp of the diagnosis process."

(5) "I consider Integrated Medicine subject is very enriching, as it allows one to integrate one has learnt through all of the other subject matters of the degree in a holistic manner."

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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