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Physiology Education

Using Patient Stories to Enhance Physiology Learning

A D C Macknight

AD Instruments, PO Box 587, Dunedin, 9054, New Zealand

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ABSTRACT

Clinical cases can be used to stimulate student interest and facilitate learning of basic biomedical sciences. For a variety of reasons, these cases are usually paper-based and, therefore, are lacking in reality for the students. An alternative, to provide video clips of actual patients discussing their conditions and illustrating symptoms and signs, is discussed in this presentation

INTRODUCTION

The majority of students coming into Physiology programs are doing so because they are curious about how the human body works in health and in disease, so it makes sense to build your curriculum around people and their stories. But what worries us all, is that this can sound like a plan to dilute the essential basic sciences and result in a course that is high in 'good intentions' but low in rigor. But this needn't be so

Why I believe in Case-based/Problem-based Learning

Some years ago now, I was involved in teaching second year medical students in their first year of physiology. We had some 200 students, all selected for the course on the basis of their grades in a competitive first year program. They were all high achievers,, most of whom had never got less than an A grade in their courses before. Yet, a quarter of these students were failing Physiology in their end of year Examination and Physiology was the most unpopular subject in the second year program. We decided to make a radical change in our conventional lecture/laboratory course.

*Address for correspondence:
Email: t.macknight@adinstruments.com

So the next year we introduced a program centered around case-based teaching. It was by no means a pure PBL course. We retained lectures but freed up time in the curriculum by replacing half of our Laboratory sessions with small group (6 students/group), case study and discussion. Whereas students had previously done one three hour laboratory session per week, they now did one a fortnight and the other week was spent on the case work. Over the year, students studied 10 cases with staff input. They also had a further 8 cases to study in their own time. We encouraged them to work in groups for this study. The end of year examination had essay questions about fundamental physiology based on two of the cases that students studied with staff input and 3 of the cases that students studied in their own time. We were astonished to find that every student passed the exam. More importantly, they demonstrated a greater depth of knowledge and understanding of the physiology than we had ever managed to teach them previously.

The Problem with Paper Cases

Although we felt very positively about the benefits of case-based teaching, I was dissatisfied with aspects of it. Here is a typical paper case that students would have been given:

> "Mrs M is a 74 year old lady who has become increasingly breathless over a number of years. She is now very limited in what she can do because of this. She was admitted to hospital

with acute respiratory symptoms on three occasions over the last two years. She has a past history of cigarette smoking.

On examination, Mrs M is a rather thin woman. Her face is a dusky color, and her lips have a bluish tinge. Her breathing is quiet but labored. Her chest movements are poor but symmetrical with a lot of activity in her accessory inspiratory muscles and expiratory effort as well. Listening to her chest reveals very quiet breath sounds. There are occasional crepitations and scattered rhonchi. Her heart rate is 82 bpm. Her heart sounds are normal."

The difficulty with paper cases is that we don't see the people as 'real'. The students always think that we have 'created' the person to provide a good example of the condition that we wish them to understand the basic physiology of. And certainly, with a paper case, there is a temptation to manipulate the story and the data to remove the complexities of real life. And, because the students don't really see the 'patient' as a person, they are not really concerned for him or her.

Video Cases

With modern computers and fast internet, it is now possible to replace these paper cases with videos. To make compelling videos what we need are co-operative patients. But we also need to be sure that the videos that we produce are of professional quality, for the students watch professional videos every day and are never happy to see 'amateur' efforts. My experience is that the most difficult part of the production is sound recording. But lighting is another problem at times. Most importantly, the format of the videos needs to be considered. Should these be filmed as interviews or should the patient speak directly to the audience? The latter seems to be the more effective in involving students in the patients and their problems.

It is also appropriate to video interviews with family and with health care professionals (doctors, nurses, physiotherapists, occupational therapists, dieticians, etc) involved with the patient. These interviews provide students with a broader perspective about the patient's problems and their professional management.

Use of Video Cases

Video cases can be used to illustrate points during lectures, as part of case-based tutorials, to reinforce laboratory work and also as part of on-line learning. They are very effective used as an introduction to the study of a new topic, for they can arouse interest in the topic and provide motivation to study it. They are also very suitable for use in group work where you wish to encourage student collaboration.

Examples of Video Cases and their Use.

Example 1

Here is how the same case, described as a paper case above, is shown in a video presentation. First, we see and hear Mrs. M as she describes her breathlessness.

"My breathlessness has gradually got worse, perhaps over the last 2 years, it has got worse.
I'm OK when I'm in bed, it doesn't seem to affect me, but it's as soon as I put my feet to the floor, that's when I find that I'm not so good.
I can't walk very far, and just everyday things, it just seems to block everything.
Oh, and always, I've got to feel right to go out somewhere, and to go to the supermarket, sometimes I can go in and do the shopping, as long as I'm holding the cart, and other times I just can't.
My poor husband has to do all of that."

We then see her walking down a corridor and it is obvious that after just a few steps she is struggling to breathe. She sits down and we can see the pursed lips and the use of the accessory muscles. Students can hear her recorded breath sounds.

When used in a Case-Based tutorial, students will generate questions that they need to research. For example:

- What is breathlessness?
- How do we normally breathe?
- Why do we need to breathe?
- Why do we get breathless when we exercise hard enough?
- Is this the same breathlessness as our patient has?
- What might we do on ourselves in the Laboratory to help us to understand this person's breathlessness?

This last question leads into possible investigations that the students can do on themselves. With modern technologies, these include:

- Spirometry with Lung Function Tests
- Peak Flow
- Effects of breath holding

Importantly, since spirometry and peak flow are performed on the patient, whose data is available, students can compare the data they have recorded in the laboratory with real data obtained from the patient. An understanding of the physiological significance of the differences between the student and patient data requires students to understand an appreciable amount of respiratory physiology.

Comparison of student and patient results also enables the students to see that what they are doing in the

laboratory is directly related to how respiratory function is assessed clinically.

A really important aspect of patient videos is that personal, family and social issues arise naturally from the interviews with patients, family and health professionals. The videos, therefore, can also be used to provide an introduction to discussion of such issues in tutorials.

Example 2
Here is another example of breathlessness. In the video, Mr H states:

"If I'm, if I go too fast when I'm out for a walk, I get a wee bit short [of breath], If I rush to do something, you know if I run or something, I get a wee bit short [of breath]. I was alright on the flat, but if I went up a hill, I have to stop 2 or 3 times to get my breath back. I've got to have pillows, a couple of pillows to keep me up a wee bit, I can't lie flat. Well, it feels as if I am short of breath if I lie flat."

He also says:

"Quite often on the farm, if I was rushing around too much, I could…sometimes I would have to sit down for five minutes…because I was dizzy and light headed.
But as long as I rested for a wee while, It would come right.
Then I started getting…if I got up to go to the toilet at night, I was quite a bit wobbly and I was hitting the walls on my way down to the toilet.
I think I was just getting out of bed too soon, and not having enough oxygen."

Again, when used in a Case-Based tutorial, students will generate questions that they need to research. For example:

- What is breathlessness?
- How do we normally breathe?
- Why do we need to breathe?
- Why do we get breathless when we exercise hard enough?
- Is this the same breathlessness as our patient has?
- What can cause dizziness?
- What can affect the amount of blood pumped out by the heart each beat?
- What might we do on ourselves in the Laboratory to help us to understand this person's breathlessness?

Note that, though breathlessness is again central to the patient's problem, the dizziness will direct the students to the cardiovascular system.

This last question leads into possible investigations that the students can do on themselves. With modern technologies, these include:

- Blood pressure measurements
- ECG
- Peripheral pulses
- Listening to, and recording, heart sounds.

Again, since these are all also performed on the patient, whose data is available, students can compare the data they have recorded in the laboratory with real data obtained from the patient. An understanding of the physiological significance of the differences between the student and patient data requires students to understand an appreciable amount of cardiovascular physiology. And, as above, comparison of student and patient results also enables the students to see that what they are doing in the laboratory is directly related to how cardiac function is assessed clinically.

Conclusions
Produced and used properly, videos of patients telling their stories can:

- motivate and stimulate student learning
- provide a link between physiology in theory and in practice
- place the physiology in context for students

Through the tutorials, we can tie the laboratory work into the lecture program. And, by so doing, help the students to appreciate that the science that they are learning is not just abstract concepts but is all about them! And, by tying the laboratory work to real situations, we also show students studying for Health Science courses that all that they are learning is relevant to the profession that they plan to be a member of.

So, from the very beginning of their training, these students learn the basic biomedical sciences in the context of how they will use the information throughout their professional lives. Also, because the patients are real people whose lives and the lives of those around them are affected by illness and the problems that this brings, it is possible to use these cases to integrate the teaching of biomedical sciences into the wider social, economic and cultural learning that is essential in all education..