

Use of patient video cases in medical education

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Abstract

Patient video cases (PVCs) are brief video recordings of patients during spontaneous or instructed activity. PVCs are true-to-life and can be replayed, enabling the establishment of highly interactive, contextual and safe learning environments, with a minimum of facilitation. This article describes the use of workshops in which PVCs are used to assist with the development of observational skills and clinical reasoning in medical students and postgraduates. We describe why PVCs are a valuable addition to an educator's portfolio of resources, what evidence there is for their effectiveness, how to use videos for teaching, and some practical advice and tips on their collection and storage.

1. Current challenges in achieving comprehensive apprenticeship experience in paediatrics

The seasonal periodicity of diseases, changes in disease prevalence and short duration of hospital stay are some of the factors that limit chances to learn by, or from, direct patient contact [1]. Demand for maximal productivity erodes teaching time [2], putting meaningful apprenticeship learning at risk. Apprenticeship learning is desirable for the development of expertise in paediatrics, and may occur before, during or after an encounter with a patient when learners compare their own observations and reasoning skills with those of an expert [3]. The use of video cases to assist in the development of observational skills lends itself very well to apprentice learning. Furthermore, while governance issues remain fundamental to ensuring patient and parent confidence, patient video cases (PVCs) are being increasingly used in medical education [4]. We are therefore in a situation whereby technology as well as public acceptance have caught up with an obvious clinical need.

PVCs have a long history in paediatric neurology[5]. Their use for diagnostic purposes, for demonstration and for in-context learning is wide-spread, and most paediatric neurologists are comfortable with their use. PVCs have also been incorporated into teaching and learning in a number of other specialities, including general paediatrics[6][7], child psychiatry,[8] and primary care.[9] Additionally, careful analysis of a series of PVCs illustrating specific disorders has expanded our knowledge about clinical presentations, particularly in paediatric neurology, e.g. in epilepsy [10][11], movement disorders[12] and neuromuscular diseases.[13]

In this paper, directed towards paediatric training units, we describe how to build a library with authentic PVCs and how to use them for teaching and learning purposes.

2. Important educational concepts

- *Script theory*: Medical expertise develops when clinicians integrate knowledge into illness scripts,[14] i.e. cognitive schemas containing a large amount of clinically relevant information. Integration of knowledge into illness scripts occurs with each new meeting with a patient. These scripts are then effortlessly activated in a process sometimes named pattern recognition [15]. PVCs may therefore support illness script formation.
- *Authentic learning*: PVCs demonstrate real-life situations,[16] and are superior to static pictures at demonstrating movements of body parts such as those seen in association with behaviour, seizures, and disorders of movement or respiration. We know that authentic PVCs are superior to text cases in improving important clinical reasoning processes[5].

- *Align learning environment with intended learning outcomes.* A recent study suggested that video clips demonstrating movements that are not essential for diagnosis may actually be detrimental to learning[17]. This probably attests to an increased and unnecessary cognitive load on the learner[18]. Therefore clinical photos are likely to be superior to video if movements are not an essential part of the clinical picture. Conversely, in emergency paediatrics, for example, the dynamic nature of clinic signs means that PVCs are a fair representation of the clinical situation [19].
- *Collaborative learning:* Elaboration involving the sharing of cognition is an important feature of collaborative learning [20][21][22]. In these studies, group discussion and interaction concentrated learning around a particular subject. A large number of relevant clinical reasoning processes has been generated in non-experts as well as experts by watching paediatric neurology video cases[23].
- *Experts know where to look:* Clinicians of varying expertise analyse patient video cases differently [24]. Eye tracking studies show that experts are able to better focus their attention while they are thinking, i.e. reasoning clinically. A recent eye-tracking study showed that attention can be directed towards important aspects of a clinical problem by using teaching videos in which less important areas were blurred [25].
- *Some novice learners can't see the wood for trees.* Novices may be distracted by the amount of detail in PVCs or when faced with real patients in real-life settings.

3. Putting it into practice

The intended learning outcomes for the group of learners in question should be taken into careful consideration. Desirable cases have one or more of the characteristics as shown in table 1. In some instances, the same video cases can be used for both undergraduates and postgraduates but with a different slant to meet curriculum objectives. Asking learners to prepare for the session by a peer-led approach is increasingly being shown to be of value [26]. We recommend a low number of PVCs for any one institution; as a few (5–10) relevant, key PVCs are much more likely to be used, discussed, learned from and taught from than a comprehensive library with a large number of PVCs. Considering the large number of variations seen in children with any disease and at any age, no library can be complete. A library with a low number of PVCs will limit time expenditure in connection with editing and managing.

We suggest that a single clinical teacher is responsible for the selection, availability and implementation of the PVCs in the curriculum at each institution.

Table 1

Characteristics of 10 conditions that involve movements that would be appropriate to illustrate in PVCs

Characteristic of condition	Example
Atypical or abnormal movements	Motor stereotypy Cerebral palsy (<i>See case study</i>)
Diminished or compensatory movements	Flaccid tetra paresis in spinal muscular atrophy Gower sign in Duchenne muscular dystrophy
Common disorders	Pneumonia Developmental delay
Conditions that are intermittent	Seizures Infantile spasms
Conditions that occur in seasonal outbreaks	Respiratory syncytial virus bronchiolitis
Conditions that require further investigation and/or treatment	Meningococcal disease

Teaching sessions in which PVCs are used may be formal, i.e. involve a time schedule and a teacher or facilitator, or they may be informal, i.e. near-spontaneous with a facilitator. The demonstration of newly admitted emergency patients on video at morning report or conference can be used to train viewing behaviour and clinical reasoning. For example, nasal flare in an infant with bronchiolitis can be demonstrated for those who have not seen it. If an authentic, new PVC recording is not available, a PVC from the department's film archive can be shown at morning conference; illustrating similarities with or differences from the actual emergency case.

Conference rooms, departments, outpatient clinics or lecture theatres can all be used for collaborative teaching and learning with PVCs, provided a screen, a facilitator and one or more learner(s) are available. In any of these environments, the learners can interact with the facilitator or take part in a small group discussion of the material. A lecture-based situation promotes use of PVCs in which clinical signs are salient, whereas smaller groups allow a more detailed discussion about more subtle features of disease. In either case, the ability to rewind and replay clips makes PVCs potentially more powerful learning resources than actual patients.

Video is the optimal modality for displaying movements, and questions like “What important movements do you see?” or “Please describe this seizure” will direct learners attention towards important features (or facts). In this regard, PVCs should probably not be used for disorders without a dynamic component [19], and conditions like rashes may be better illustrated by photographs.

Healthcare professional education is becoming increasingly multi-professional, and, although PVCs have principally been used in medical education, there is no reason why they cannot be used in the training of other health care professionals. Furthermore, inter-professional learning and collaboration can be facilitated by medical students and nurses viewing cases together.

To be included in a textbox:

Case Study 1

If you are not familiar with it, you won't see it, and you may miss the diagnosis.

These three frames are taken from a PVC and reproduced with permission of the parents.

>>>>[Please insert figure 1 here]>>>>

History: A 6-month-old girl with a mild motor developmental delay.

Tasks:

- Please describe the important signs.
- What is the most probable diagnosis?

Correct findings and diagnosis:

- Signs include asymmetric use of hands and fisting of the right hand. The right thumb is positioned in the palm.
- The most probable diagnosis is unilateral spastic cerebral palsy.

This PVC would be appropriate for the teaching of medical students as well as physicians in training for careers in general practice and paediatrics.

During the workshop session you should consider the following:

- Start by acknowledging the families who agreed to the use of the video recording of their children.
- *Train visual attention.* Replaying parts of the PVC or slowing the speed of the video may help to demonstrate subtle features.

- *Train diagnostic accuracy:* A question like “Please make a probable diagnosis” will direct attention.
- *Activate learners by letting them elaborate:* Buzz groups of two or three will allow everybody to be active, *and* this approach reflects real-life practice and teamwork. To facilitate apprenticeship learning, the clinical experience of buzz group members should vary. It is important that students or junior clinicians can elaborate and verbalise their observations without fear of being misconstrued in front of a multitude of colleagues. Such a non-threatening learning environment with feedback allows the less experienced learners to compare their own observations with those of more experienced clinicians.
- After a discussion of the differential diagnostic possibilities, the discussion of plans for the investigation and management will be the logical, and highly focused, next step.
- The facilitator may think aloud and explain how she or he might go about describing and diagnosing this case.
- When the session is finished, the facilitator should summarise the case and ask learners what they will do to learn more about the topic covered.

4. Practical advice on collection and storage

Obtaining new footage is important to keep a collection relevant and up-to-date. Although a great deal of footage is already available via open access websites such as www.spottingthesickchild.com and www.reeldx.com, use of your own local footage allows it to be better tailored to your educational requirements. Care should be taken when using videos from popular social media video sites. The quality of the information is not standardised, although a study has shown that PVCs from YouTube can illustrate infantile spasms, and can be used for teaching if guided search practice is followed [27]. Some practices may not be compatible with local guidelines, and it would be unethical to advocate viewing footage where consent has not been obtained. Valuable recordings are often made by parents. Such recordings may need editing.

- *Have recording equipment easily available*

Clinical pathology is everywhere but is not possible to capture unless you have the equipment available. Security in hospitals is an issue, and leaving a video camera available for all to use may result in it being misplaced or stolen. A locked media cabinet containing videographer equipment, spare batteries, consent forms and information leaflets is a useful investment.

- *Obtain consent*

Consent is important, and this is emphasised in both national and local guidelines. Local guidelines may include, however, a prohibition on using your own mobile devices as recording tools. This may not seem pragmatic given the quality of current devices but does avoid any

misinterpretation of intent. Clearly, it is important to explain to parents why you are filming. Parents usually agree when they know that future patients may benefit by being treated by doctors who have improved their diagnostic skills during training through the use of authentic patient video cases. Consent should be clear about to whom the footage is going to be shown and in what context. It must be clear whether the footage is for health care professional use only or might be available on a publically accessible website. Obtaining permission from parents or children who are severely ill is challenging. Delaying video recording until appropriate management has been initiated will likely enhance an appreciation of the importance of video recording for teaching purposes. Children and parents should be given the opportunity to watch the footage recorded of them in the screen of the camera prior to giving consent. The guide to the data protection act (DPA) from the Information Commission [28] does not have a separate section on data protection, although their guidelines on anonymisation infer that videos are qualitative materials [29]. Nevertheless, the data protection of the videos must be as robust as any piece of clinical data and follow the principles of purpose (education), adequacy and accuracy.

- *Obtain and use really short clips*

A big challenge for a cameraperson is restraining the urge to record everything you see. It is beneficial to have a wide shot at the outset and the end, a recording of any observations and a video of the consent form. Generally, 30–60 seconds of footage is appropriate.

- Storage

Accessible technology enables those without media backgrounds to record footage for use in their own institutions. It is important to use a coding mechanism that allows easy recall of clips and conforms to the DPA by not recording names and addresses. (The Spotting the Sick Child project team used the system in shown in table 2) [30]

Table 2 – A coding system for video cases
<ul style="list-style-type: none"> • Patient ID and clip ID within it • Patient age • Patient ID with link to consent form in a separate database, with each consent form scanned in as a read-only file • Clip key words ("croup" etc.) • Clip description and/or further key words • Section ID (if cataloguing for a particular purpose) • Cameraperson ID

Footage should be downloaded onto a secure hard drive once taken, and then the memory of the camera should be deleted (this is a mandatory requirement of the national Data Protection Act). This helps to prevent inappropriate viewing of recordings by other patients and parents.

Conclusion

New, authentic teaching and learning modalities are needed.

Short video clips may enable establishing highly interactive, contextual and non-threatening learning environments with a minimum of facilitation. Initial analysis of PVCs including characteristic movements in patients, which may be subtle, periodic or infrequent, are suitable for use in buzz groups and optimise interactivity. Letting learners elaborate on their findings and compare them with the findings of more experienced clinicians enhances attention, clinical reasoning and diagnostic accuracy. Teaching and learning with PVCs in a workshop format may improve medical expertise for the benefit of the patients.

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Figure One



These 3 frames from a patient video depict a 6 months old girl with a mild motor developmental delay. Observations include asymmetric use of hands and fisting of the right hand. The right thumb is positioned in the palm. The most probable diagnoses is unilateral spastic cerebral palsy.