

# Implementing video cases in clinical paediatric teaching increases medical students' self-assessed confidence

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## ABSTRACT

**INTRODUCTION:** Use of video cases in clinical education is rarely used systematically.

**MATERIAL AND METHODS:** Medical students (n = 127) reported by questionnaire whether they had or had not seen a bedside case of each of 22 specific clinical conditions during their five-week clinical course in paediatrics in seven centres. A video case library showing children with common clinical conditions was established, and a short video was added to the oral examination. We evaluated students' and internal and external examiners' perceptions by questionnaires.

**RESULTS:** A total of 81% of the students reported having seen a child with asthma in the daily clinic. In contrast, respiratory syncytial virus infection was only seen by 20%. Students' self-reported confidence in the assessment of paediatric patients increased after the video case library was made available: Before the intervention, 41% (57/138) of the students reported confidence at a score of 5-7 on a seven-point Likert scale. This increased to 64% (186/289) after ( $p < 0.0001$ ) the introduction of the video case library. Before, 84% (116/138) of the students judged the impact of video cases to be high (score 5-7 on a seven-point Likert scale) and after the intervention, this share was 75% (218/289) ( $p = 0.06$ ). Furthermore, internal as well as external examiners found video cases valuable, but the use of videos did not change the average examination grade.

**CONCLUSION:** A video case supplement to teaching in clinical paediatrics was considered to be of value for teaching. We were successful in establishing an educational resource that students considered useful. Internal and external examiners found that a short video case was a valuable supplementary tool during the oral examination.

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**TRIAL REGISTRATION:** not relevant.

Use of video cases in clinical education is a well-known [1-4] supplement, but it is seldomly used systematically due to various issues, including legal and technical problems.

Although the literature is sparse, it has been described that using video cases can increase knowledge

and skills about paediatric procedures among medical students [5]. Overall, students are very positive towards video-based education [3, 6] and the use of video cases enhances student engagement and activity [1, 2, 7]. Veterinary students considered the quality of sound (but not picture), accessibility including electronic location and video content as most important for usefulness [6]. Balslev et al showed that the use of video cases increases the diagnostic precision among non-experts [8] and that, compared with a text case, video cases resulted in a deeper verbal interaction in the discussion group with improvement in data exploration, theory building and theory evaluation [9].

We hypothesized that final-year medical students did not achieve sufficient clinical competence in assessing the initial presentation of common paediatric disorders during their clerkship period in paediatrics and that the use of video cases would increase the students' self-reported confidence in the assessment of the paediatric patient.

Many video cases can be localised on social media, such as YouTube, but the technical quality varies and video cases may have been edited so that they are inappropriate or unethical for educational use. We therefore decided to develop a video case library for self-study as well as for video-based tutorial sessions. Furthermore we introduced a short video case in the oral assessment in paediatrics.

The aim of the study was to investigate the impact of implementing video cases in clinical paediatric teaching and examination of medical students. We here report the results of questionnaires from students, teachers and external examiners.

## MATERIAL AND METHODS

### Participants and context

A group of paediatric professors, associate professors and consultants in paediatrics with an interest in video-based teaching were assisted by a junior doctor who was employed as an investigator/full-time project manager (MM) for 15 months.

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 TABLE 1

Contents of the paediatric video case library and the number of video cases included into the library – video cases to be used in examination are excluded.

Category	Content (n)
Neurological conditions	Seizures/epilepsy (18) Paresis (1) Others (3)
Psychological/physical development	Normal and abnormal development, classified according to age: 1-3 months (17), 4-6 months (15), 7-9 months (3), 10-12 months (12), 13-18 months (17), 1.5-3 yrs (13) Others (2)
Respiratory conditions	Respiratory infections: RSV/bronchiolitis (3), pneumonia (3), croup/stridor (8), whooping cough (2) Asthma (3)
Cardiovascular conditions	Arrhythmia (1) Congenital heart diseases (1)
Gastroenterology Nephrology/urology	Unspecified stomach pain (2) Others (1)
Musculoskeletal conditions	Juvenile rheumatoid arthritis (1) Others (1)
Dermatological conditions	Infections with dermatological manifestations (4) Allergic skin reactions (1) Eczema (5)
Neonatology	The normal new-born child (24) The new-born child with hypotonia (31) Respiratory distress (1) Neonatal infections (1) Prematurity (1) Jaundice (3) Congenital malformations (2) Others (1)
Others	Infections (1) Others (3)
The paediatric clinical examination and different procedures	Basic paediatric examination (15) Paediatric neurological examination (18) Procedures: IV cannula (1), knee puncture (1), skin prick test (1), CPAP (1), ventricular tube (1)

CPAP = continuous positive airway pressure; IV = intravenous; RSV = respiratory syncytial virus.

Copenhagen, nearly 220 students each semester attend a compulsory five-week undergraduate course in paediatrics. The course takes place simultaneously at seven hospitals at Zealand. Just after the clerkship period, there is a compulsory oral, case-based examination.

#### The paediatric video case library

A library of 180-200 short video cases demonstrating children with paediatric diseases was established during the autumn semester of 2011 (Table 1).

The emphasis was on common paediatric diseases, even though rare conditions were also included. In all video cases, the presentation of the patient was edited, allowing assessment of the general condition as well as characteristic symptoms of the presented condition. A short written description of the case was added to all video cases.

The video case library was disseminated from the e-learning platform of the University of Copenhagen. After

written parental accept, MM produced all the video cases. A standard, small user-friendly digital camera with video function and a decent picture and sound quality was used. Parents were informed that they could withdraw their consent at any time and they were told that their case would then be deleted. Furthermore, good video cases located on YouTube, as well as video cases from other universities or textbooks were included in the video case library after permission had been obtained. As from the spring semester of 2012, the students as well as professors, associate professors and other teachers at the paediatric department associated with the University of Copenhagen had access to these paediatric video cases. The university has facilities to keep a log of all use of the library.

#### Tutorials in video cases

From the autumn of 2011 to the spring of 2012, students systematically received tutorials based on video cases covering various topics. These tutorials were imparted by MM. In the autumn of 2012, local teachers held the tutorials. Furthermore, the teachers used the video cases from the library or video cases of their own ad hoc in their teaching.

Teachers participated in the tutorials held by MM in the spring of 2012.

#### Video cases in oral examination

A special collection of 15 video cases was produced for the purpose of examination. Due to safety procedures, the collection was placed on hospital servers in a limited-access folder as well as a limited-access USB-stick with access for internal examiners only during the examination period. These video cases had a duration of approx. 30 seconds. The student was only given the age of the child and the setting (out-patient, emergency room or ward). After 20 minutes of examination in a text-only case, the student blindly picked one of the video cases. The student was allowed to see the video twice and then presented his/her description of the general appearance of the child, the specific symptoms and a proposal for a diagnosis. This part of the examination lasted five minutes. The student's performance in the text-only case and video case resulted in a joint examination grade (given according to the 7-point grading scale as well as the ECTS scale).

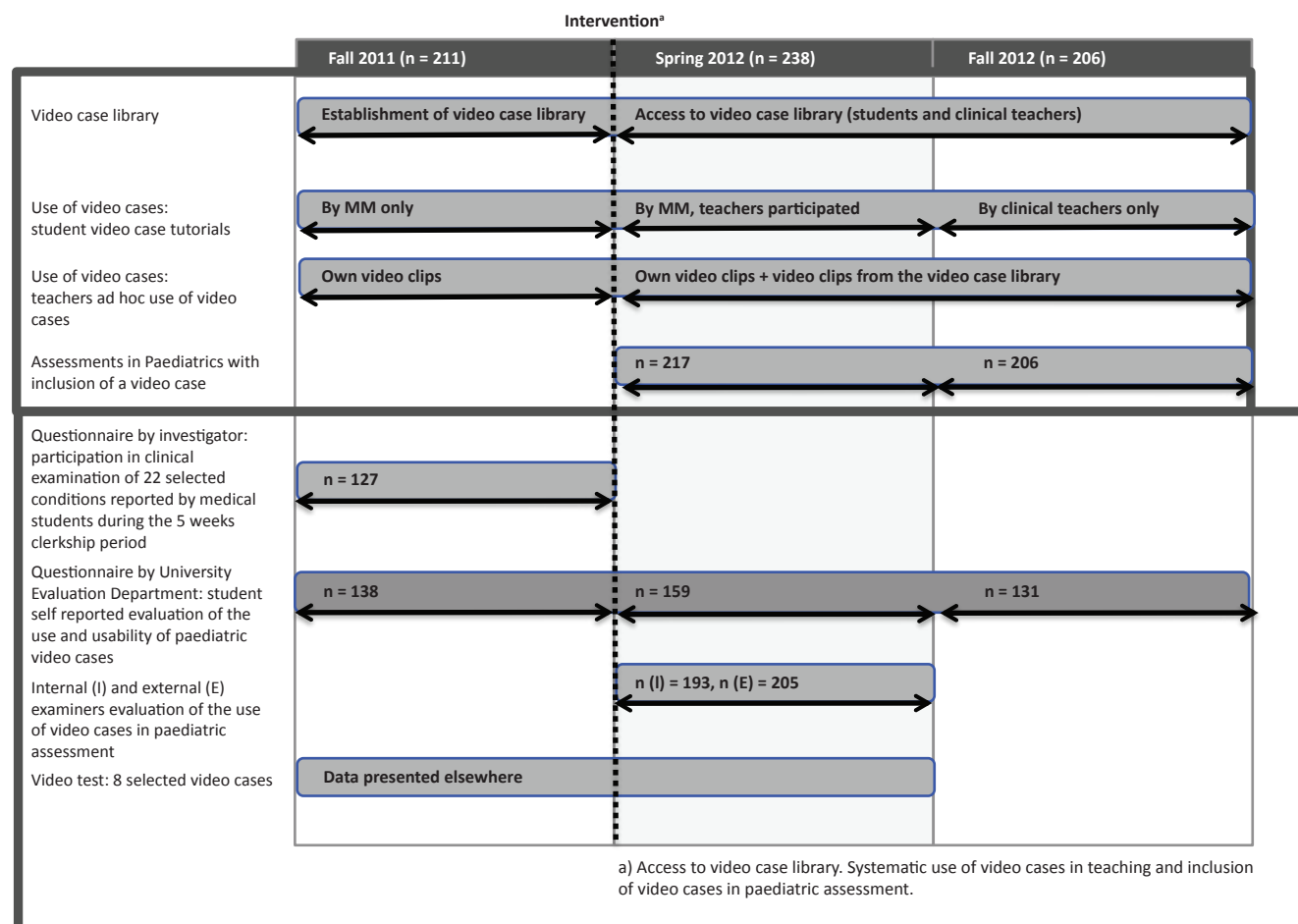
The needs assessment, intervention and evaluation of the use of video cases

Students from three semesters were included into the study: autumn 2011, spring 2012 and autumn 2012 (Figure 1).

During the autumn semester 2011, the need for an educational supplement was assessed by a questionnaire, asking whether students had or had not partici-

FIGURE 1

Project timeline.



pated in the examination of a child with 22 selected conditions during the clerkship period (Table 2) (conditions commonly presented at paediatric units or uncommon, but serious conditions, defined in the paediatric curriculum) [10].

We used the regular university system for student evaluation to achieve feedback at the end of the course: in the autumn of 2011, the Evaluation Division of the Faculty of Health and Medical Science added questions about the self-evaluated confidence in evaluation of common clinical conditions in the paediatric patient, on the number and sources of video cases seen during the course, and on the impact of video cases in the learning of paediatrics. It was all evaluated on a 7-point Likert scale. For the spring and autumn of 2012, questions regarding the examination video were added.

Furthermore, the paediatric teachers (internal examiners) and the external examiners in the spring of 2012 answered a simple questionnaire on a 5-point

Likert scale concerning the usefulness of the video cases for examination purposes and the impact on the student's performance and grades.

Finally, in the autumn of 2011 and spring of 2012, the students received a test consisting of eight video cases. A comparison of the results for the two periods will be published separately.

#### Statistics

Statistics were done by Yates'  $\chi^2$ -test and the Mann-Whitney test. The tests were done two-tailed and the level of significance was set at 0.05.

*Trial registration:* not relevant.

#### RESULTS

The students did not see patients with all the important clinical conditions during the clerkship period (Table 1). For example, whereas 81% reported to have seen a child

TABLE 2

Percentages of medical students who had undertaken a physical examination of specific, real patients during the clerkship period (n = 127).

Condition	%
Cerebral deterioration	36
Child with pain	80
Cardiovascular failure	26
Respiratory failure	78
Dehydration	45
Failure to thrive	56
Delayed psychological/physical development	50
Growth disturbances	54
Disturbances in sexual development	24
Asthma	81
Bronchiolitis/RSV	20
Croup	44
Pneumonia	65
Gastroenteritis	38
Seizures	17
Cerebral palsy	32
Urinary tract infection	65
Diabetes	29
Fever	94
Healthy newborn	91
Newborn with respiratory distress	66
Newborn with jaundice	65

RSV = respiratory syncytial virus.

with asthma, only 20% had seen a child with bronchiolitis.

According to the university log, 89% of the students (211/238) logged into the video case library during the spring of 2012, which agreed well with the students' own reports (88%, 121/138). These figures were maintained in the autumn of 2012 (94%, 193/206).

In general, the tutorials with video cases were well received with good activity and engagement from all the students present. In the spring of 2012, 82% (113/138) of the students reported to have participated in video-based tutorials and this was maintained in the autumn of 2012 (83%, 90/109), ( $p = 0.88$ ).

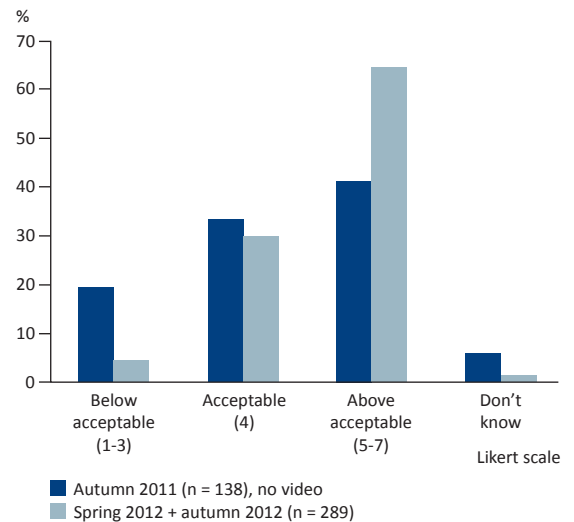
After the interventions (access to the video case library, systematic use of video cases in teaching and inclusion of a video case in the assessment in paediatrics), significantly more students rated their self-assessed confidence in the assessment of the paediatric patient as "high" (64% (186/289) versus 41% (57/138)) ( $p < 0.0001$ ) (Figure 2).

No significant difference was seen between the spring and autumn semester in 2012 (106/159 versus 80/130,  $p = 0.39$ ) in both of which video cases were used.

Before the intervention, 84% (116/138) of the students rated the potential impact of video on their learn-

FIGURE 2

Student self-reported confidence in the assessment of the paediatric patient after the course in paediatrics had concluded.



ing as "high" (scores 5-7). Interestingly, after video cases were introduced, this decreased non-significantly to 75% (218/289,  $p = 0.06$ ).

In the spring of 2012, 99.5% (216/217) of the video case examinations were executed. Technical problems appeared in 1% (3/217) of the examinations. The video case was rated appropriate in 93% of examinations by the internal examiners (177/190) and in 83% (163/196) by the external examiners. Inappropriate video cases were corrected or replaced. Internal and external examiners rated the video case tests to be important or very important on a 5-point Likert scale for the assessment of student performance in 43% (83/193) and 49% (101/205) ( $p = 0.17$ ) of the examinations, respectively. Internal and external examiners reported that the video cases changed the students' grades in 37% (69/197) and 35% (68/194) of the examinations, respectively, but overall the grades were unchanged at a median 10(B) (range: -3(F) to 12 (A)),  $n = 117$ , before and a median 10(B) (range: 00(Fx) to 12(A)),  $n = 141$ , after video cases were included ( $p = 0.99$ ).

Overall, students commented positively on the use of video cases, although students in the first rotations in the spring of 2012 reported to have felt unprepared for the video part of the examination.

## DISCUSSION

We confirmed the need to supplement bedside teaching with paediatric patients and succeeded in developing a video case library, which was accessible, used, and appreciated by the majority of the students. We find it a

major strength that the video cases produced are authentic and reflect what is actually seen in the paediatric departments. Further, they do not solely focus on the presentation of specific symptoms, but also allows training of the assessment of the child's general condition. Like Balslev et al [7, 9] we have also experienced that using video cases in clinical education is an eye-opener that activates and engages students as well as teachers.

The project was time-demanding and one person was employed full-time for 15 months. Important input was also given by the members of the working group and by the IT consultant of the university. The implementation required a continuous pedagogical effort and full success has not been achieved since the teachers have not yet fully integrated video cases in their teaching.

Our study is limited by being based on questionnaires only, as it is difficult to identify the important issues in such complex problems and to formulate precise questions which will provide the wanted knowledge. Doing supplementary focus group interviews would have further strengthened the study.

Wanting an authentic supplement to the paediatric examination, we chose to include video cases in the examination to increase the focus on the use of videos as students' base their learning strategies on needs [11, 12] and on what will enable them to pass their assessments [11, 13]. Like others [3], we found that students judged that the impact of video cases on learning was high, even though a decreasing trend was observed after the interventions. One critique was that students in the first rotations in the spring of 2012 felt unprepared for the video part of the examination.

After the interventions, students reported a significantly higher self-assessed confidence, although this can be a coincidence produced by many other influencing factors. We have found no other studies investigating the impact of video cases on students' confidence in the evaluation of the paediatric patient.

The video-based tutorials were an important part of the implementation process. During the tutorials, it was our impression that students were generally unsecure in recognising even common findings like retractions or stridor and basically found it difficult to describe the child and the symptoms even though it became easier during the tutorial after the first couple of video cases. In the autumn of 2012, the local teachers (paediatric professors and associate professors) delivered the tutorials. This may also be related to the insignificant decrease in students' judgement of impact as the tutorials were not fully integrated at all departments and students therefore had to do more self-study in the video library during this period. We find it reasonable to assume that the benefit for the less-experienced students

is greater when videos are integrated with the teaching of an experienced clinician as compared to self-study of video cases with written explanations, which is also supported by other studies [14, 15]. Further studies are required on the topic of the impact of authentic video cases on students' ability to describe and diagnose patients in real life and on how to identify the topics suitable for video-based teaching.

Students as well as internal and external examiners were very positive towards the use of video for oral examination. Although internal and external examiners reported that the video case resulted in a change in the examination grade for four out of ten students, the grade point average remained unchanged. This is remarkable and indicates that the students' description of a paediatric patient from a 30-second video case gives valuable information.

## CONCLUSION

There is a significant limitation in the availability of paediatric patients with important clinical conditions available for bedside teaching in the clerkship period. After the introduction of a paediatric video case library, student's self-reported confidence increased significantly. Three of every four student assessed the impact of video cases on their learning as being high.

Short video cases were a good supplement and contributed considerably to the oral examination. The average examination grades remained unchanged. From a resource perspective, the project has been costly.

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