Slide 1: Hello, everyone, thank you all for joining this presentation. My name is Sara and Im a medical doctor and currently also a post graduate student at UCL, enrolled into a taught Medical Education programme.

Slide 2: Today’s session will include a topic that is related to the education of medical students and similarly can be applied to any health care professionals. I graduated from medical school not too long ago and so I have a keen interest in this topic area, and interested in how education for medical students can be improved for the new generations

This session is a work in progress in itself, and I will summarize the findings of a literature review that I conducted recently, looking into the role of electronic case based learning in medical education

We will talk about what case based learning itself is in a second but lets first go through the outline of how this session will run

We will talk briefly about the background of this method of learning, and then I will explore with you all how I went on about conducting this review, and most importantly, the findings and what lessons we can take away from this

Slide 3: There are about 2600 medical schools worldwide, and inevitably, the way that medical students get taught how to be safe doctors varies varies hugely across different medical schools in the uK and worldwide, medical school is usually 5-6 years world wide, which means that a lot of teaching goes on!!

Slide 4: **Case-based learning (CBL) is a newer modality of teaching healthcare students**

* Is a teaching method which links theory to practice by using clinical cases and application of knowledge
* Very similar to PBL but focuses on specific patient cases to identify learning objectives
* It is taught in small groups with a tutor to guide group discussions
* Can be relevant to clinical placements

Slide 5: The usage of Case-based learning has been well established in medical education since 1920s, where it now has ample of research and literature which prove its effectiveness in enhancing medical students’ overall clinical practice and analytical skills

Slide6 : Over the last number of decades, the adoption of online learning in medical education has been increasing in popularity, This is especially true since the appearance of the unprecedented Coronavirus Disease 2019 pandemic (COVID-19) which created a sudden and noticeable shift towards the exclusive usage of online learning environment as the main source of medical education

Slide7 : Virtual teaching has shown to be cost- effective, convenient and enables the maximization of institutional resources, However, some disadvantages of a virtual learning environment have also been recognized, including technical issues and the time constraints

Slide 8 : So what is important about this? And why are we doing this now? well delivering CBL virtually to medical students is an exciting educational prospect, and although there is a plethora of literature on CBL within medical education, there is a paucity of literature within the contexts of electronic CBL(e-CBL), where the literature **seems to be scant and unfocused**

Slide9 : OVID Medline and British Education Index databases were searched with a keyword search strategy

Each key word searched included alternatives to allow for their respective acronyms

Given the time limit for this literature review, inclusion and exclusion criteria were then applied

Slide 10 : These are some of the inclusion and exclusion criteria

* Side 11: Studies were then identified and screened, and the process was reported in a flow diagram below (Table 3).
* In total, 149 papers were excluded, and the final number of papers used in this literature review is 20. These were determined to be appropriate for the scope of this review.
* Most of the papers were excluded based on their title or abstract. There were no requirements for an ethical review as there were no human participants.

Slide12: This includes the breakdown of how papers were used, but in a nutshell, 20 papers were deemed to be appropriate for this literature review

Slide13 :The objectives of this literature review are organized into the below themes:

* Slide14: Some of the themes included in the paper talked about *Improving test scores*
* *Beyond MCQ scores*
* *Comparison with face-to-face CBL*
* *Comparing with other types of teaching*
* *Perspectives of students*
* *The benefits and limitations of online CBL*

Slide14 : The first thing that I looked at, which is what most students care about, is does eCBL help students improve their grades? Well.. Recently published papers

assessed the effectiveness of delivering e-CBL to medical students using ‘’pre-session’’ and ‘’post-session’’ multiple-choice questions (MCQ) to evaluate for an increase in students’ knowledge and found test scores of students improve by more than 35%.

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Slide16: Well..students care mostly about marks..but medical schools also need to ensure doctors are competent in other ways… well, we can see here that Ecbl was found to be effective in improving reasoning skills, confidence skills, patient safety aspects and even improved students ability to make written admission referrals to other specialities…..that is all looking quite positive, isn’t it?

Slide17: But how does electronic CBL compare to the face to face CBL? And does it have any advantages of doing this online, rather than the standard Face to face?

We can see here that different papers have noted different conclusions, with some of them stating Electronic CBL can be superior to traditional lectures, but others stating that Increase in knowledge did not differ between the

 in-person and the e-CBL group

slide18 : Well, in the literature review, it was found that overall, There is still considerable uncertainty with how e-CBL compares to an- in person approach due to the lack of literature that discusses this.

The majority of the papers which evaluate e-CBL also fail to attempt to directly compare it with a face-to face teaching.

That is something to highlight, and definitely an area that required further research

Slide19 : How about what do students prefer? We know that we are not sure 100% if electronic CBL is more effective than face to face, but is one mode more convenient for students, than the other? Well, it turns out that e-CBL environment is embraced and well- accepted by the majority of students and students find e-CBL to be enjoyable and useful way to learn, which is encouraging, because it means we can then implement this going forward, and not just use it during COVID!

Slide20 : One interesting aspect of the virtual CBL learning environment is that it can be beneficial for students whose English is not their first language, where it was found by a paper that ECBL allowed non native English speakers to have enough time to understand and respond to the educational questions at their own pace.

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Now we have talked a lot about what students like and don’t like, but what about our tutors? It was remarkable that only one paper addressed preference of the teaching mode from the perspective of the tutors and found where the majority of **the tutors e-CBL experience was actually worser than the in-person experience**. It fails however to detail why that is, as such findings could be attributed to a variety of reasons such as less engagement of students or technical issues.

Slide21 : It is worth noting that there are many benefits and limitations to consider when thinking about whether eCBL is a good option for a medical school, for example, eCBL allows increased flexibility, and helps students have a better work life balance as it reduces things like commute time for them

Slide22: And with online learning, the opportunities are endless, for example, from using video conference apps such as Zoom, to some medical schools building whole expensive softwards such as ’Medical Master Island’’ avatar programme used. and

although developing new educational electronic modules require expertise and dedicated time, the electronic modules are often sustainable and cost-effective

slide23 : However, ecbl also comes with some disadvantages that medical schools must think about before adopting it as a teaching method

The main recurreing theme with e-CBL was having technical issues throughout many of the papers described and Data connectivity was even an issue with low maintenance software such as WhatsApp.

Slide24: Another interesting note to be aware of is that although online modes of delivery can have increased attendance rates due to the ease of access, reduced engagement can often be found with the online learning environments

Slide 25: So…… what have we learnt? Overall, the delivery of e-CBL to medical students has generally shown to be effective way of

facilitating learning

improving learning outcomes

increasing knowledge of medical students across different specialities.

Slide26 : There is satisfactory agreement between papers that students find e-CBL to be an enjoyable and flexible way of learning, which is encouraging in emergency situations such as the COVID-19 pandemic that took place, where e-learning may be the only option.

 Other key themes discussed in the literature review centred on the advantages and disadvantages of e-CBL and how it compares with other types of learning.

Slide27 : Moving forward

Further research is however necessary to assess the long-term benefits of using e-CBL looking to assess whether the increased knowledge retains over time.

Additionally, the findings regarding the superiority of e-CBL when compared directly to other types of teaching, such as face-to-face teaching still remains unclear and require further experimental research.

Slide 28 : Thank you all for learning, this is a summary of what we have discussed today. The main key points summarized here focus on medical students education, but can be quite relevant to other health care professionals. This is the ideal time to think about the adaption of online CBL, as its popularity increased during covid,where it was the only way possible to deliver it at the time however, as we now move away from the covid pandemic, we have the opportunity to think about what lessons can be learnt, and is an ideal time for us to think about how we can redesign the way in which students are taught, and to use online learning outside just zoom!