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Personalising airway clearance in PCD, exploring expert physiotherapist decision making.

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Background

Airway clearance techniques (ACTs) are a key component in managing conditions where normal secretion clearance is impaired (Fig.1), such as Primary Ciliary Dyskinesia (PCD)[1]. There are numerous ACTs available and methods of application and whilst current guidance recommends ACTs are personalised, it is unclear how this happens in practice.

Aim

We aimed to understand how physiotherapists currently personalise airway clearance when working with children and young people with PCD.

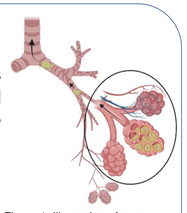

Figure 1: Illustration of mucus clearance from the lower respiratory tract. Created with BioRender.com.

Methods

Critical decision method (CDM) was used to capture tacit knowledge, using specific incidents with non-routine cases as a highly efficient method of knowledge elicitation. Six expert physiotherapists from the paediatric PCD national management services were interviewed on how they personalise ACTs, with four progressively detailed passes through a recent non-routine case incident (Fig. 2). Transcripts were coded to Klein's Recognition-Primed Decision model[2] (Fig 3.), and to a personalisation conceptual framework based on the physiotherapy literature.

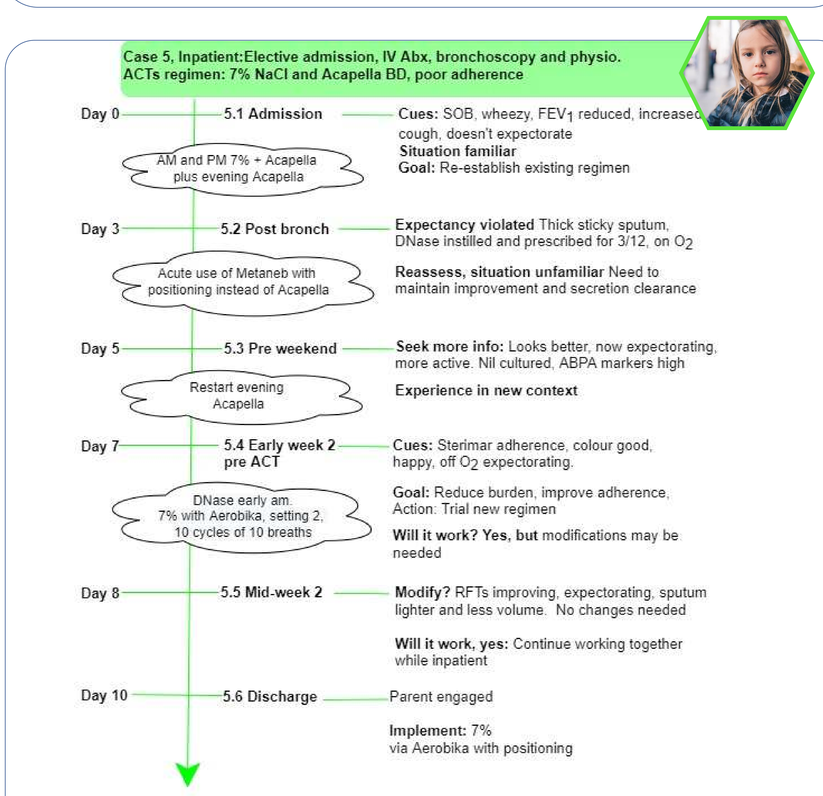

Figure 2: Timelines illustrating RPDM stages (bold) and decisional shifts (clouds) for three of the Cases.

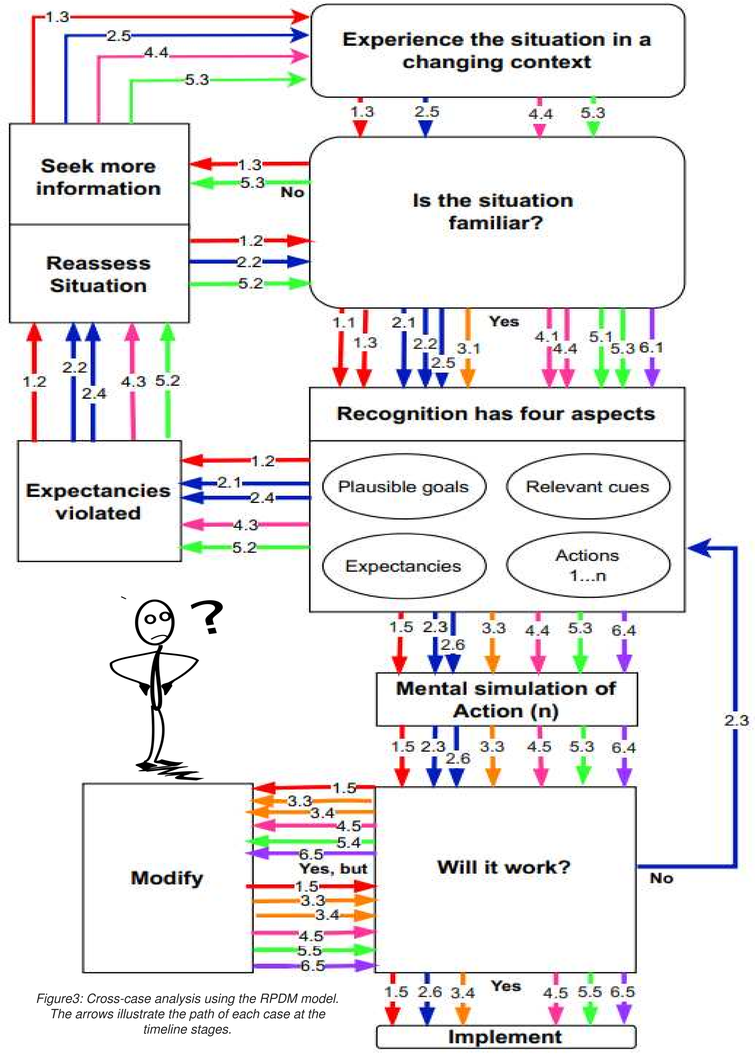

Figure3: Cross-case analysis using the RPDM model. The arrows illustrate the path of each case at the timeline stages.

Results

All physiotherapists initially recognised the situation as familiar even when the case was new to their service, using: cues and expectancies which informed goals and actions;

> He had previously held his breath…and hadn't tolerated having the (PEP) mask on so I was more expecting him to not tolerate it.
> (Expectancy, Case 4.1)

> He was quite crackly, particularly… in his…right mid zone on auscultation, he was clearing more sections…more fatigued …those key...assessment findings prompted me to…recognise that something needed to change
> (Cue, Case 3.1)

> I need to see that the Aerobika was going to be enough
> (Goal, Case 5.4)

Initial courses of action were reconsidered in four cases, when expectancies were violated, causing the physiotherapists to seek further information to familiarise the situation;

> I wouldn't normally give somebody an incentive spirometer for airway clearance, but Mum had…said that it was really helpful…it was really interesting…to actually unpick that…to actually work out what's going on.
> (Violation of expectancies, Case 1.2)

Physiotherapists mentally simulated and/or physically piloted ACT regimens to satisfy themselves that the plan was sound. Sometimes the first action conceived was rejected following simulation, and in most cases modifications were needed prior to implementation;

> By the end of the session his chest was significantly clearer….this form of airway clearance was effective.
> (Will it work? Yes, Case 6.5)

> The whole thing is great idea to wake up at half four in the morning and do physio, but the reality is erm that's not going to happen.
> (Will it work? No, Case 2.3)

Conclusion

When personalising ACT regimens, despite initially finding the situation as familiar, physiotherapists often encountered uncertainty. Physiotherapists iteratively seek the information needed to familiarise the situation, and simulate courses of action, prior to implementing regimen changes. CDM is a useful approach to understand how ACT regimens are personalised, it remains unclear what the effects of such personalised ACT regimens are.

References

1. Lucas, J. S., et al. (2017). "Clinical care of children with primary ciliary dyskinesia." Expert Rev Respir Med **11**(10): 779-790.
2. (Klein 2008) Klein, G. (2008). "Naturalistic Decision Making." Human Factors: The Journal of the Human Factors and Ergonomics Society **50**(3): 456-460.

Conflicts of interest:
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