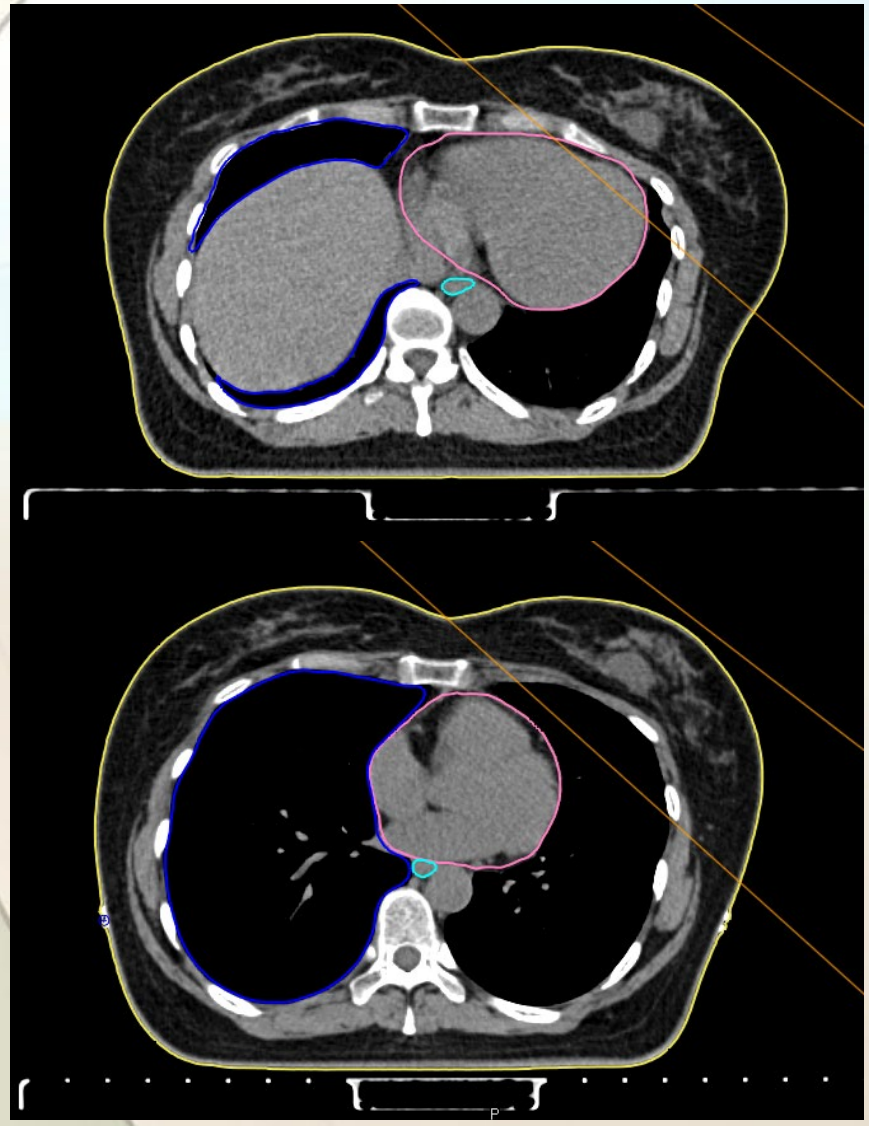
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Clinical audit: Using Lights Instead Of Auditory Cues For Achieving Voluntary Deep-Inspiration Breath Hold In Patients Undergoing Breast Radiotherapy

Jill Kennard
Band 7 Pretreatment Radiographer

The Royal Marsden NHS Foundation Trust
Sutton

Deep Inspiration Breath Hold Summary



Breath hold results in pushing the heart down and away from the radiotherapy field and immobilises the chest.

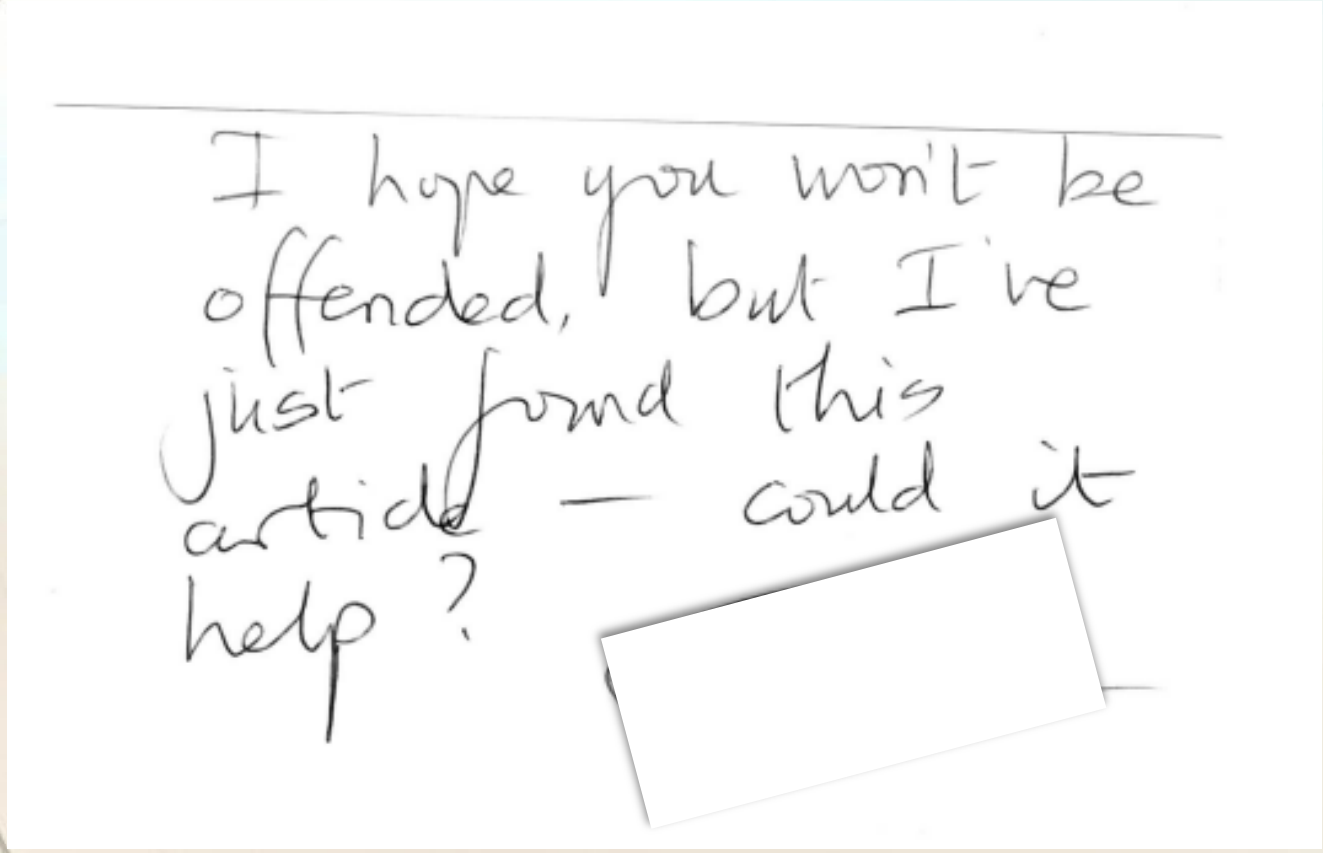
This reduces risk of heart damage during breast radiotherapy

Benefits included a reduced number of radiation-induced coronary events and ischemic heart disease in patients receiving breast radiotherapy.

Inspiration

- Patient referred for radiotherapy to left Breast for treatment in breath hold
- Patient was deaf with auditory processor
- Advised by doctor to remove the processor for radiotherapy
- Unable to hear the auditory cues for breath hold instructions
- Patient was scanned in free breathing – excluded from the potential benefits of the tissue sparing technique

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Problem-Solving as a Team to Find a Solution for Deaf Cancer Patients

The cancer center's radiation oncology team recently faced a new challenge using the deep inspiration breath hold technique when they realized they couldn't use their intercom system to communicate during treatment with a patient who is deaf.

Dr. Dunn says, "We couldn't give audible instructions on when to take a deep breath and hold it, so we needed to figure out a way to provide deep inspiration breath hold but alter the way in which we provided those instructions."

The team brainstormed ideas for an alternative communication system and came up with using a light inside the treatment room.

"When the green light appeared, the patient would take that deep breath in and hold it. When we turned the light off, it meant that it was OK to breathe," says lead radiation therapist Morgan Stueber.

Red lights to instruct patients to breathe normally



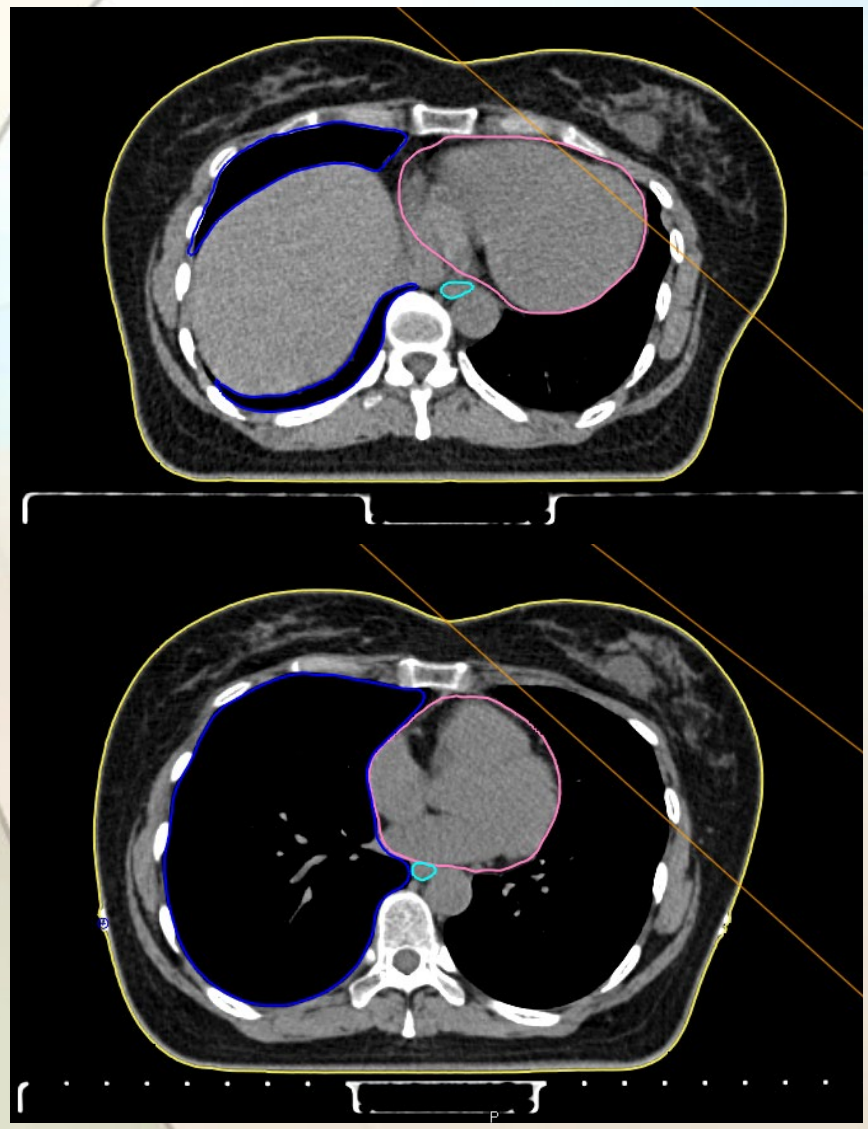
Green Lights to instruct patients to breathe in and hold their breath



Methodology

- ✓ Get the idea
- ✓ Identify the aim
- ✓ Complete a clinical audit proposal form
- ✓ Present at the clinical audit meeting & get advice
- ✓ Produce the questionnaires
- ✓ Deliver the training to Radiographers using the lights
- ✓ Patient selection
- ✓ Rolling out the protocol
- ✓ Gathering & storing the data
- ✓ Evaluation

Rationale & Aims



- Previously, deaf or non-English speaking patients may have been excluded from breath hold.
- This may have resulted in greater side effects due to the loss of tissue sparing.

To provide an effective and inclusive technique of achieving breath hold, in patients that cannot use traditional auditory cues.

What did we want to find out?

- Patient and Radiographer satisfaction
- How clear the lights were?
- How easy it was to follow?
- Was it easy to explain to the patient?
- Did it work?
- Was it time efficient?
- Compare with traditional auditory cues

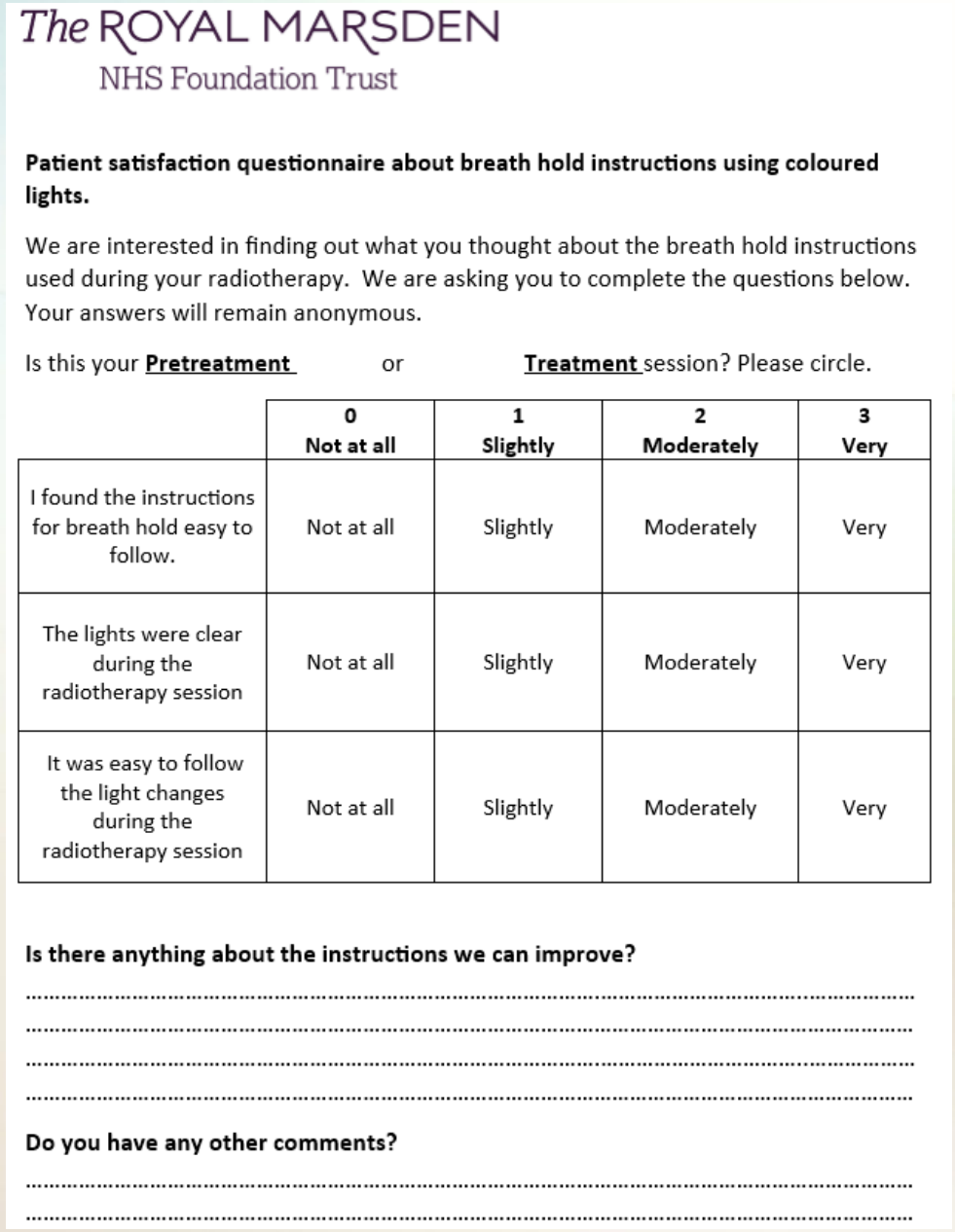
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Questionnaires

Patient input is important

Patient and Public Involvement Group:

- Avoids response error
- Avoid response burden
- Reviews questions and provides feedback



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Patient satisfaction questionnaire about breath hold instructions using coloured lights.

We are interested in finding out what you thought about the breath hold instructions used during your radiotherapy. We are asking you to complete the questions below. Your answers will remain anonymous.

Is this your **Pretreatment** or **Treatment** session? Please circle.

	0 Not at all	1 Slightly	2 Moderately	3 Very
I found the instructions for breath hold easy to follow.	Not at all	Slightly	Moderately	Very
The lights were clear during the radiotherapy session	Not at all	Slightly	Moderately	Very
It was easy to follow the light changes during the radiotherapy session	Not at all	Slightly	Moderately	Very

Is there anything about the instructions we can improve?

.....

.....

.....

.....

Do you have any other comments?

.....

.....

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Selecting the patients

60 patients were selected for the study.

30 patients were scanned using light cues.

30 were scanned using standard auditory cues.

1. Radiographers gain verbal consent at pretreatment appointment.
   (Explain rationale and questionnaires)
2. First 30 patients were recruited to the light cues and 30 using auditory cues
3. Keep records and document patient trial arm
4. Questionnaires were given after pretreatment scanning appointment
5. Repeat Questionnaires were given after the completion of their treatment
6. Collect the data

IMPORTANT: HAVE A SAFE PLACE TO LEAVE THE QUESTIONNAIRES INCASE YOU ARE NOT THERE

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Keeping Track

	Pt ID	Lights or Verbal	Pretreatment Date	Treatment start date	Treatment finish date	Treatment machine	Questionnaire Done	Initial		
1	[redacted]	lights	22-Nov	06-Dec	12-Dec	maple	DONE	BVH		
2		lights	24-Nov	27-Dec	17-Jan	cedar				
3		lights	27-Nov	18-Dec	22-Dec	maple	Done			
4		lights	28-Nov	18-Dec	22-Dec	maple	Done			
5		lights	29-Nov	27-Dec	17-Jan	maple				
6		lights	01-Dec	19-Dec	27-Dec	maple	Done		Patient Started	
7		lights	28-Nov	11-Dec	22-Dec	cedar	Done		Completed	
8		Light	29-Nov	21-Dec	15-Jan	cedar	*FOR PARABLE- CANCELLED*		Not yet scanned	
9		lights	01-Dec	18-Dec	22-Dec	maple	Done		Cancelled	
10		lights	07-Dec	27-Dec	03-Jan	cedar	Done			
11		lights	15-Dec	09-Jan	15-Jan	cedar	Done			
12		lights	14-Dec	08-Jan	12-Jan	Cedar	Done			
13		lights	21-Dec	17-Jan	06-Feb	cedar	Done			
14		lights	21-Dec	18-Jan	24-Jan	cedar	Done			
15		lights	21-Dec	08-Feb	28-Feb	Maple	Done			
16		Lights	03-Jan	18-Jan	07-Feb	cedar	Done			
17		lights	04-Jan	19-Jan	08-Feb	Cedar	Done			
18		Lights	11-Jan	N/a	N/a		*Patient unable to tolerate VBH lights - form completed			
19		Lights	10-Jan	22-Jan	09-Feb	Maple	Done			
20		Lights	16-Jan	30-Jan	05-Feb	Cedar	Done			
21		Lights	16-Jan	06-Feb	26-Feb	Cedar	Done			
22		Lights	19-Jan	19-Feb	08-Mar	Cedar	Done			
23		Lights	19-Jan	02-Feb	08-Feb	Cedar	Done			
24		Lights	22-Jan	06-Feb	26-Feb	cedar	Done			
25		Lights	17-Jan	31-Jan	06-Feb	Pine	Done			
26		lights	24-Jan	15-Feb	06-Mar	Pine	Done			
27		lights	25-Jan	08-Feb	14-Feb	Pine	Done			
28		lights	25-Jan	09-Feb	15-Feb	Maple	Done			
29		lights	29-Jan	19-Feb	23-Feb	Pine				
30		lights	30-Jan	20-Feb	11-Mar	maple				

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Entering the data & looking at trends

Part 1

Patient	Completed Treatment Questionnaire Results				VBH lights
Patient	Question1	Question2	Question3	Improven	Commnts
1	3	3	3	No, but I c	If breath holds wasn't deep enough and you were then
2	3	3	3	No thanks	\
3	3	3	3	Verbal Ins	\
4	2	3	2	I found it (	\
5	3	3	3	\	\
6	3	3	3	Maybe count when breathing in. Ex 'breth in 1, 2, Hold"	
7	3	3	3	\	\
8	3	3	3	\	\
9	3	3	3	No, all cle	N/A
10	3	3	3	\	All good, thank you.
11	3	3	3	All good	Found easy to watch colours and no issues
12	2	3	3	\	\
13	3	3	3	All fine	All very clear
14	3	3	3	No	No
15	3	3	3	I found the lights easy to follow despite sometimes needing a co	
16	3	3	3	I found It '	I think it would be useful for the nurses/practitioners t
17	1	3	3		
18	2	3	3		
19	1	3	3		
20	2	3	3	I found the instructions easy to follow	
21	2	2	2		
22	3	3	3		
23	2	2	2		
24	3	3	3		
25	2	2	2		

"I found the lights easy to follow despite sometimes needing a couple of extra seconds to catch my breath once the lights had changed"

"Nothing to change. The staff explained the process and helped me feel comfortable given that I was 3 weeks post surgery"

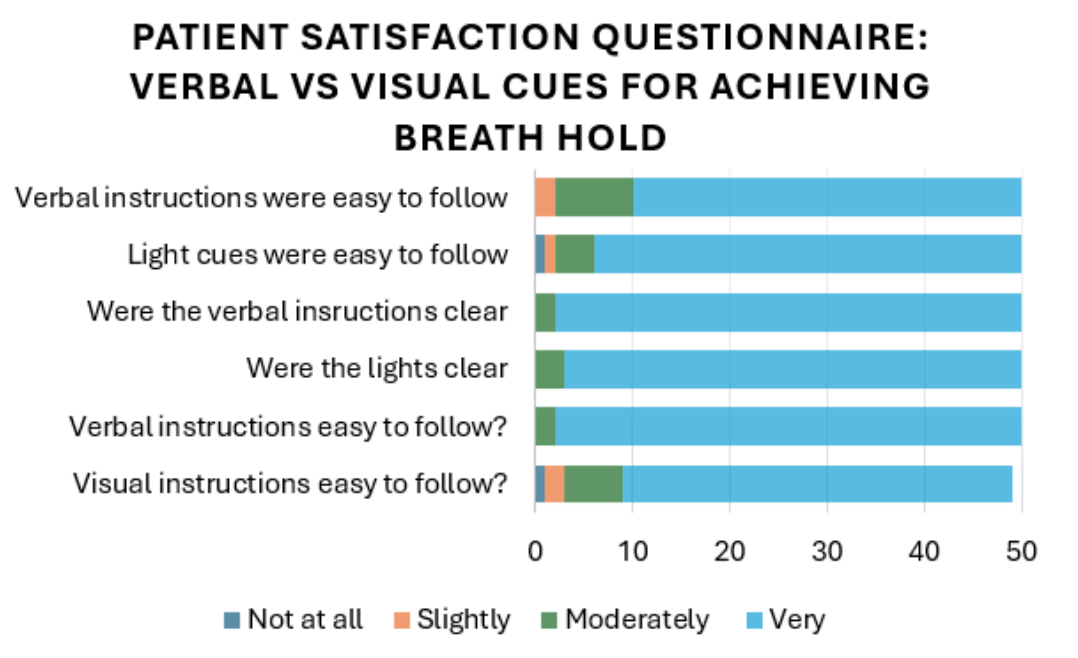
Pretreatment Patient Questionnaire Results					VBH lights
Patient	Question1	Question	Question3	Improven	Comments
1	3	3	3	When in t	No, fine system
2	3	3	3	\	\
3	3	3	3	Not at all	Everybod were so kind
4	3	3	3	I found the increment breathing practise helped me to hold 20 secs	
5	3	3	3	Nothing -	Staff explained the process and helped me feel comfortable given
6	3	3	3	\	\
7	3	3	3	No - very (	Much better instruction than the disembodied voice
8	3	3	3	\	\
9	3	3	3	\	\
10	3	3	3	\	\
11	3	3	3	Instructio	One has to lean back quite a bit to see light at back, though I could
12	3	3	2	Instruction was very calm & clear. Perhaps practise the breathing in the mach	
13	3	3	3	\	\
14	3	3	3	There is a	Only re: booking me in at 8am for the 'chat' which began at 8.40 - as
15	3	3	3	I was not sure initially whether I could breathe between light changes. I did b	
16	3	3	3	\	\
17	3	3	3	No	Staff made me feel comfortable and at ease. Very warm and attent
18	2	2	1	I was happy using the lights but found the breathing difficult	
19	0	3	0	\	Too much to focus on the lights as well as breathing which was diff
20	3	3	3	\	\
21	3	3	3	\	When inside scan green light slightly difficult to see
22	3	3	3	No, every	No
23	3	3	3	No	No
24	3	3	3	All very cl	Great, competent staff
25	3	3	3	\	\
26	2	2	2	\	\
27	3	3	3	No	For me personally, voice instruction worked best
28	3	3	3	\	All good

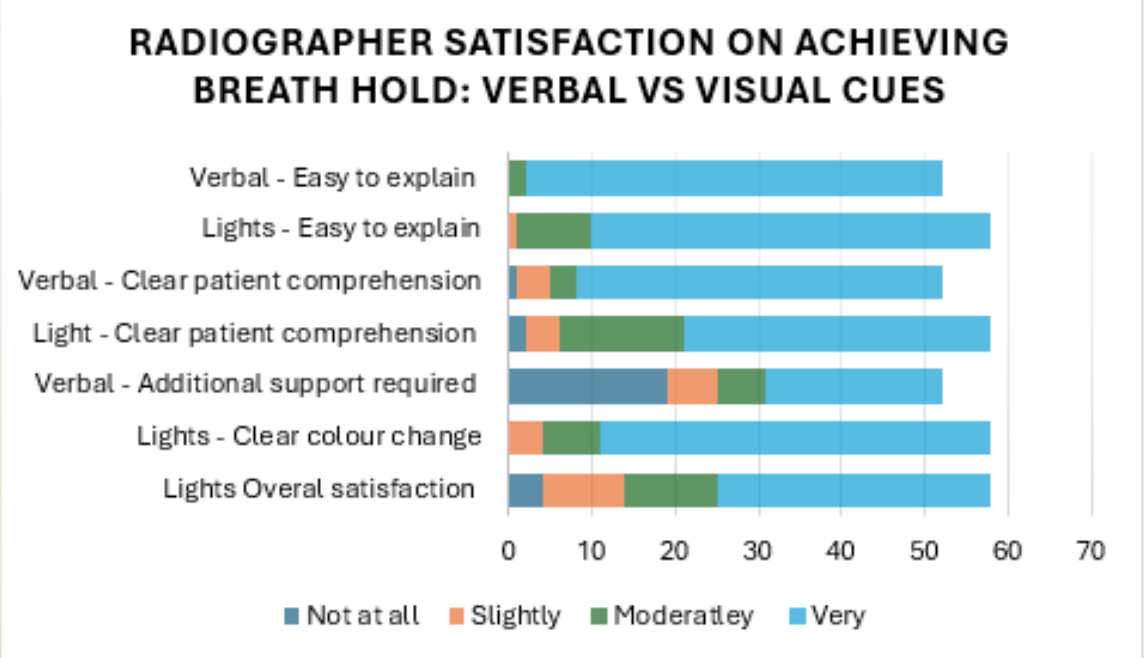
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Entering the data & looking at trends

Part 2

0- Not at all	1- Slightly	2- Moderately	3- Very





Using Lights Instead Of Auditory Cues For Achieving Voluntary Deep-Inspiration Breath Hold In Patients Undergoing Breast Radiotherapy

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Radiotherapy, The Royal Marsden Sutton
The Royal Marsden NHS Foundation Trust

Aims

The standard practice for voluntary deep-inspiration breath hold (vDIBH) is to verbally instruct patients to perform breath hold.

The objective of the audit was to determine whether the use of visual cues (coloured lights) would be a viable, alternative option to include patients unable to follow verbal instructions. For these patients, switching to a free breathing technique may result in potential loss of tissue sparing that comes with the vDIBH technique.(1)



Figure 1. Red lights to indicate normal breathing and green lights to indicate breathe in and hold.

Background

Breath hold treatment requires asking the patient to 'breathe in', 'hold breath' and 'breathe out' for both the planning CT and treatment sessions via the intercom. A small cohort of patients find auditory cues difficult or impossible. For example, those with hearing deficits (Cochlear implant devices that need removal) or where English is not a first language. For these patients a viable, visual option was required as an alternative to auditory cues (Figure 1).

Method

A cohort of 30 patients using visual cues were given a survey following radiotherapy planning and after one treatment. The radiographers involved were given a similar survey.

The aim was to ascertain the usability, visualisation and satisfaction of using lights as an alternative. The survey included an optional section for suggestions, possible improvements and further comments.

For comparison, a further 30 patients and radiographers that used traditional auditory cues were also given a survey at the same intervals.

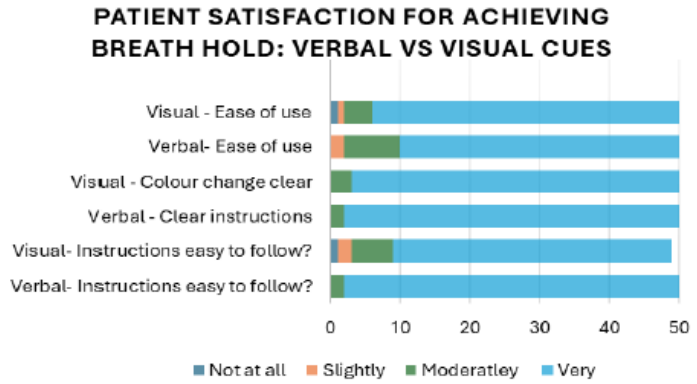


Figure 2. Patient survey question & results.

Patient Results

29/30 patients were scanned successfully using visual cues. 1 patient was unable to follow the visual instructions. In comparison 30/30 patients were scanned using verbal instructions. Patient satisfaction and understanding for both verbal and visual prompting for breath hold were comparable. (figure 2)

Notably, patients required less prompting for over breathing/under breathing at CT than at treatment suggesting that due to the time gap between sessions, further training on day 1 of treatment may be required.

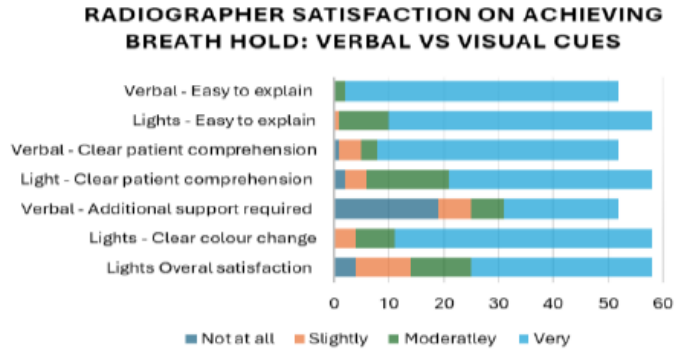


Figure 3. Radiographer questions & results.

Radiographer Results

Radiographer feedback suggested that the lights were easy to explain and visualise. Additional verbal support was given to patients in the verbal cues control group to assist breath hold. This would not be feasible for patients using visual cues.

Additional feedback by both radiographer and patients identified difficulties in correcting for under or over breathing in the study group. (figure 3). This may have had an impact on radiographer satisfaction.

Conclusion

The use of lights is a viable and inclusive option for patients referred for breath hold treatment. However, more training or use of further visual guidance may be required to support patients using visual cues that struggle to achieve consistent breath holds.

Acknowledgments

With thanks to the patients, radiographers, breast consultants and the clinical team at The Royal Marsden for participating in this study.

References

1. Bartlett, F.R., Colgan, R.M., Carr, K., Donovan, E.M., McNair, H.A., Locke, I., Evans, P.M., Haviland, J.S., Yarnold, J.R. and Kirby, A.M. (2013). The UK HeartSpare Study: Randomised evaluation of voluntary deep-inspiratory breath-hold in women undergoing breast radiotherapy. Radiotherapy and Oncology, 108(2), pp.242–247.

What was needed

- Form a working party: A supportive team to collaborate with and share the work.
- Expert advice: Someone to go to, to provide support, guidance and assistance throughout the process.
- Continuous professional development & further training: Tailored in house by research radiographers to develop necessary skills
- Mandatory staff training: 30-minute mandatory drop-in sessions over 2 days
- Protected time: Work with management to block out time per week
- Software for data entry: Microsoft Teams for uploading and sharing documents securely

Difficulties faced & what was learned?

- Time restraints
- Staff training/misunderstanding/leave
- Keeping clinical with additional workload
- Providing a safe space for staff to come if they find barriers or difficulties
- Compliance: “We don’t like change!”

i. Set objectives
ii. Set time frame
iii. Identify the needs to test the equipment
iv. Being clinically supported will support this temporary change in practice.

What could have been done differently

- Larger sample size- more accurate data
- Have the system available on more treatment machine = more patients using the lights
- More time to speak to patients/staff to get in depth feedback- focus groups/interviews
- How can I get the best out of the teaching sessions- how can you get others on side? **On reflection:** Repeat training, consider time frames and reminders.

Closing the loop: The impact on clinical practice

- Our aim of allowing all patients to have equal access to the tissue sparing breath hold technique was achieved.
- Previously, deaf patients would have been excluded; we are now able to offer this technique to all who would benefit.
- A researched technique that we can offer for any patient that may have difficulty with using auditory cues for VDIBH

What now?

- Feedback suggested that patients that used the lights needed more support and the lights have less control in the depth of the breath hold.
- More training?
- More flexibility/light increments?
- Can this technique be used for other patients that use breath hold - for lung/abdomen?

Thank you

Any questions?