

# BMJ Paediatrics Open

BMJ Paediatrics Open is committed to open peer review. As part of this commitment we make the peer review history of every article we publish publicly available.

When an article is published we post the peer reviewers' comments and the authors' responses online. We also post the versions of the paper that were used during peer review. These are the versions that the peer review comments apply to.

The versions of the paper that follow are the versions that were submitted during the peer review process. They are not the versions of record or the final published versions. They should not be cited or distributed as the published version of this manuscript.

BMJ Paediatrics Open is an open access journal and the full, final, typeset and author-corrected version of record of the manuscript is available on our site with no access controls, subscription charges or pay-per-view fees (<http://bmjpaedsopen.bmj.com>).

If you have any questions on BMJ Paediatrics Open's open peer review process please email [info.bmjpo@bmj.com](mailto:info.bmjpo@bmj.com)

# BMJ Paediatrics Open

## Targeted neonatal echocardiography training: a survey of trainees in a region of England

Journal:	<i>BMJ Paediatrics Open</i>
Manuscript ID	bmjpo-2022-001465
Article Type:	Original research letter
Date Submitted by the Author:	28-Feb-2022
Complete List of Authors:	Cleator, Alexander; Liverpool Women's Hospital, Department of Neonatal Medicine Subhedar, Nimish; Liverpool Women's Hospital, Department of Neonatal Medicine
Keywords:	Neonatology, Cardiology, Qualitative research

SCHOLARONE™  
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1  
2  
3 Targeted neonatal echocardiography training: a survey of trainees in a region of  
4 England  
5  
6  
7

8 Alexander James Cleator<sup>1</sup>, Nimish Vasant Subhedar<sup>1</sup>  
9

10  
11 **Author affiliations:**  
12

13 <sup>1</sup>Department of Neonatal Medicine, Liverpool Women's Hospital, Liverpool, UK  
14  
15

16  
17 **Correspondence:**  
18

19 Alexander James Cleator, Department of Neonatal Medicine, Liverpool Women's  
20 Hospital, Crown Street, Liverpool, L8 7SS, UK. E-mail: [acleator@doctors.org.uk](mailto:acleator@doctors.org.uk)  
21  
22

23  
24 **Key words:**  
25

26 Echocardiography; colour doppler echocardiography; neonatal intensive care;  
27 postgraduate medical education;  
28  
29

30  
31 **Word Count:**  
32

33 570  
34  
35

36  
37 **Reference Count:**  
38

39 3  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Abstract

Targeted neonatal echocardiography (TNE) is an important skill to advise diagnosis and management. Training in TNE is currently optional for neonatal subspecialty (grid) trainees and accessing training is often challenging. We disseminated a survey, asking neonatal grid trainees for their views on TNE training. 96% of trainees (n=48) wanted to learn TNE with similar numbers eager to access a formal training package, utilising a variety of teaching media. Identified barriers to TNE training included time, access to supervision and the perceived complexity of the skill. These findings will influence the design and delivery of a regional TNE training programme.

Confidential: For Review Only

1  
2  
3 Targeted neonatal echocardiography (TNE) is an increasingly utilised skill in the care  
4 of the unwell newborn and premature baby. Expert consensus statements exist in  
5 the UK,[1] Europe[2] and the USA[3] which outline suggested requirements for  
6 developing proficiency in TNE, including the need for paediatric cardiology and  
7 neonatology placements during training and practical guidance on scanning,  
8 reporting and referral to a cardiologist. These statements differ in their  
9 recommendations and there remains a lack of a formal TNE syllabus and access to  
10 appropriate accredited training opportunities.  
11  
12

13  
14 We are considering developing a TNE curriculum and training package, to be  
15 delivered to neonatal grid trainees during their subspecialty training in the region. We  
16 sought to obtain the views of current trainees about TNE, their desire for formal  
17 training and what elements they considered important in a proposed training  
18 package. We identified potential participants from a North of England neonatal  
19 trainees' education group which was established during the coronavirus pandemic  
20 and meets virtually for educational activities on a regular basis. The group is  
21 comprised of neonatal trainees from 6 different deanery training programmes. We  
22 distributed an online survey (appendix 1) with a mixture of likert scale, multiple  
23 choice and free text questions to 91 neonatal grid trainees. The response rate was  
24 53%, with 48 trainees responding.  
25  
26

27  
28 Our data was overwhelmingly positive, demonstrating that 96% (46/48) of trainees  
29 want to learn and develop TNE as a skill with 94% (45/48) of them highlighting that a  
30 formal training programme would be welcomed. 96% of these trainees would be  
31 willing to fund such a programme from their study leave budgets and all of them  
32 would be willing to travel within their local deanery to access such training. Over half  
33 of the trainees (56% (27/48)) felt very strongly about TNE, expressing that a formal  
34 training programme should be considered a compulsory element of sub-speciality  
35 training.  
36  
37

38  
39 We explored trainees' views on how such a programme would be delivered. Online  
40 modules and virtual small group sessions were favoured against in-person lectures  
41 and tutorials to cover the theoretical elements of TNE. The option of a paper-based  
42 workbook was appealing to only 17% (8/48) of trainees. Small group cot-side  
43 teaching was preferred over one to one teaching for the practical elements of the  
44 course and 77% (37/48) of surveyed trainees expressed that an echo simulator  
45 would aid in learning and development of skills.  
46  
47

48  
49 All trainees agreed that some form of assessment would be required during a  
50 training programme with 90% (43/48) of trainees suggesting that their images should  
51 be critiqued by an assigned supervisor. Accessing appropriate supervision was  
52 identified as a problem by several trainees in the free-text part of the survey. One  
53 explained how appropriate support and supervision was the main barrier to her  
54 further developing skills learnt on a TNE course, whilst another expressed that  
55 Consultant support was essential but not currently present on her unit. Other  
56 identified barriers to accessing training included time and the perception that TNE is  
57 more difficult to learn and practice than other neonatal skills.  
58  
59

60  
61 In summary, there is a desire amongst neonatal trainees for a formal, structured TNE  
62 training programme. It should contain a mixture of virtual and in-person elements

1  
2  
3 and present an opportunity for trainees to be assessed and critiqued. Appropriate  
4 supervision and support in developing TNE skills has been highlighted as a potential  
5 barrier to learning and this would need to be carefully considered in any deanery  
6 designing and delivering such a programme.  
7  
8  
9

10 **Contributors:** NVS conceptualised the study. The methodology, survey design and  
11 data collection were completed by AJC. The manuscript was written by AJC and  
12 edited by NVS.  
13

14 **Funding:** This research received no specific grant from any funding agency in the  
15 public, commercial or not-for-profit sectors  
16  
17

18 **Competing Interests:** None  
19

20 **Patient and public involvement:** There was no patient or public involvement in this  
21 study  
22

23 **Patient consent for this study:** Not applicable  
24  
25  
26  
27  
28  
29

## 30 **References**

- 31  
32 1. Singh Y, Gupta S, Groves AM, et al. Expert consensus statement 'Neonatologist-  
33 performed Echocardiography (NoPE)'-training and accreditation in UK. *Eur J Pediatr.*  
34 2016;175(2):281-287.  
35  
36 2. de Boode, W., Singh, Y., Gupta, S. *et al.* Recommendations for neonatologist  
37 performed echocardiography in Europe: Consensus Statement endorsed by  
38 European Society for Paediatric Research (ESPR) and European Society for  
39 Neonatology (ESN). *Pediatr Res*, 2016;80:465–471.  
40  
41 3. Mertens, L., Seri, I., Marek, J. *et al.* Targeted neonatal echocardiography in the  
42 neonatal intensive care unit: practice guidelines and recommendations for training:  
43 writing group of the American Society of Echocardiography (ASE) in collaboration  
44 with the European Association of Echocardiography (EAE) and the Association for  
45 European Pediatric Cardiologists (AEPC). *European Journal of*  
46 *Echocardiography*, 2011;12(10):715-736.  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Targeted neonatal echocardiography training: a survey of trainees in a region of England. Survey questions.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**1. Which of the following would best describe your current level of experience with targeted neonatal echocardiography (TNE)? Please select all that apply to you.**

- I have no experience with TNE
- I've attended a neonatal/paediatric echo course
- I've had some informal echo teaching during my training (opportunistic cot-side teaching etc.)
- I can acquire a few basic images
- I can acquire all necessary images
- I can acquire all necessary images and interpret them under supervision
- I scan regularly and feel confident interpreting my images

**2. On a scale from 1 (Not at all) to 5 (Definitely) - Is TNE a skill you wish to learn/develop as a neonatal grid trainee?**

- 1
- 2
- 3
- 4
- 5

**3. If you do not wish to learn and practise TNE, can you tell us why?**

**4. On a scale from 1 (Not at all) to 5 (Definitely) - Do you think TNE training should be a compulsory element of the neonatal sub-specialty curriculum?**

- 1
- 2
- 3
- 4
- 5

**5. On a scale from 1 (Not at all) to 5 (Definitely) - Would you find a formal, structured TNE training programme useful as a neonatal grid trainee?**

- 1
- 2
- 3
- 4
- 5

**6. On a scale from 1 (Not at all) to 5 (Definitely) - Would you be willing to pay for a formal TNE training programme/package or have it taken from your study leave allowance?**

- 1
- 2
- 3
- 4
- 5

**7. How do you see the theory elements of a TNE training programme being delivered? Please select as few/many as you feel appropriate.**

- Online modules that I complete at my own pace
- Live online/virtual small group lectures with the opportunity for interaction
- In-person lectures/tutorials
- A paper-based workbook

**8. How do you see the practical elements of a TNE training programme being taught? Please select as few/many as you feel appropriate.**

- Online module(s) that I complete at my own pace – I'd practice in my own time
- Teaching sessions using an echo simulator under supervision
- Small group face-to-face teaching at the cot-side with an opportunity to practice what we've just seen demonstrated
- One-to-one teaching at the cot-side with an opportunity to practice what we've just seen demonstrated

**9. Which of the following (if any) do you see as forming part of the assessment element of a TNE training programme? Please select as many/few as you feel appropriate.**

- Quizzes/questions during or after each theory module
- Echo image interpretation quizzes
- Scan images reviewed and critiqued by a supervisor



**Targeted neonatal echocardiography training: a survey of trainees in a region of England. Survey questions.**

- Having your own scans observed by a supervisor
- A written and practical examination at the end of the training programme
- I would not want to be assessed in any way

**10. On a scale from 1 (Not at all) to 5 (Definitely) - Would you be willing to travel (within your deanery) to access a TNE training programme?**

- 1
- 2
- 3
- 4
- 5

**11. On a scale from 1 (Not at all) to 5 (Definitely) - would you be willing to travel outside of your deanery to access some (or all) of a TNE training programme?**

- 1
- 2
- 3
- 4
- 5

**12. Is there anything else you'd like to tell us about your views on TNE training and what you think should be included in a TNE training programme? Any other thoughts about how such a programme could be delivered? Would you like to expand on any of the answers you've already given us?**

For Review Only

# BMJ Paediatrics Open

## Targeted neonatal echocardiography training: a survey of trainees in a region of England

Journal:	<i>BMJ Paediatrics Open</i>
Manuscript ID	bmjpo-2022-001465.R1
Article Type:	Original research letter
Date Submitted by the Author:	01-Apr-2022
Complete List of Authors:	Cleator, Alexander; Liverpool Women's Hospital, Department of Neonatal Medicine Subhedar, Nimish; Liverpool Women's Hospital, Department of Neonatal Medicine
Keywords:	Neonatology, Cardiology, Qualitative research

SCHOLARONE™  
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1  
2  
3 Targeted neonatal echocardiography training: a survey of trainees in a region of  
4 England  
5  
6  
7

8 Alexander James Cleator<sup>1</sup>, Nimish Vasant Subhedar<sup>1</sup>  
9

10  
11 **Author affiliations:**  
12

13 <sup>1</sup>Department of Neonatal Medicine, Liverpool Women's Hospital, Liverpool, UK  
14  
15

16  
17 **Correspondence:**  
18

19 Alexander James Cleator, Department of Neonatal Medicine, Liverpool Women's  
20 Hospital, Crown Street, Liverpool, L8 7SS, UK. E-mail: [acleator@doctors.org.uk](mailto:acleator@doctors.org.uk)  
21  
22

23  
24 **Key words:**  
25

26 Echocardiography; colour doppler echocardiography; neonatal intensive care;  
27 postgraduate medical education;  
28  
29

30  
31 **Word Count:**  
32

33 600  
34  
35

36  
37 **Reference Count:**  
38

39 3  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Abstract

Targeted neonatal echocardiography (TNE) is an important skill to advise diagnosis and management. Training in TNE is currently optional for neonatal subspecialty (grid) trainees and accessing training is often challenging. We disseminated a survey, asking neonatal grid trainees for their views on TNE training. 48 out of 91 trainees (53%) completed the survey. 96% of trainees (n=48) wanted to learn TNE with similar numbers eager to access a formal training package, utilising a variety of teaching media. Identified barriers to TNE training included time, access to supervision and the perceived complexity of the skill. These findings will influence the design and delivery of a regional TNE training programme.

Confidential: For Review Only

1  
2  
3 Targeted neonatal echocardiography (TNE) is an increasingly utilised skill in the care  
4 of the unwell newborn and premature baby. Expert consensus statements exist in  
5 the UK,[1] Europe[2] and the USA[3] which outline suggested requirements for  
6 developing proficiency in TNE, including the need for paediatric cardiology and  
7 neonatology placements during training and practical guidance on scanning,  
8 reporting and referral to a cardiologist. These statements differ in their  
9 recommendations and there remains a lack of a formal TNE syllabus and access to  
10 appropriate accredited training opportunities.  
11  
12

13  
14 We are considering developing a TNE curriculum and training package, to be  
15 delivered to neonatal grid trainees during their subspecialty training in the region. We  
16 sought to obtain the views of current trainees about TNE, their desire for formal  
17 training and what elements they considered important in a proposed training  
18 package. We identified potential participants from a North of England neonatal  
19 trainees' education group which was established during the coronavirus pandemic  
20 and meets virtually for educational activities on a regular basis. The group is  
21 comprised of neonatal trainees from 6 different deanery training programmes. The 2  
22 authors developed an original online survey (appendix 1), comprising a mixture of  
23 Likert scale, multiple choice and free text questions. The survey was distributed to 91  
24 neonatal grid trainees. The response rate was 53%, with 48 trainees responding.  
25  
26

27  
28 Our data demonstrated that 96% (46/48) of the responding trainees want to learn  
29 and develop TNE as a skill, with 94% (45/48) of them highlighting that a formal  
30 training programme would be welcomed. 96% of these trainees would be willing to  
31 fund such a programme from their study leave budgets and all of them would be  
32 willing to travel within their local deanery to access training. Over half of the trainees  
33 (56% (27/48)) felt very strongly about TNE, expressing that a formal training  
34 programme should be considered a compulsory element of sub-speciality training.  
35  
36

37  
38 We explored trainees' views on how such a programme would be delivered. Online  
39 modules and virtual small group sessions were favoured against in-person lectures  
40 and tutorials to cover the theoretical elements of TNE. The option of a paper-based  
41 workbook was appealing to only 17% (8/48) of trainees. Small group cot-side  
42 teaching was preferred over one to one teaching for the practical elements of the  
43 course and 77% (37/48) of surveyed trainees expressed that an echo simulator  
44 would aid in learning and development of skills.  
45

46  
47 All trainees agreed that some form of assessment would be required during a  
48 training programme with 90% (43/48) of trainees suggesting that their images should  
49 be critiqued by an assigned supervisor. Accessing appropriate supervision was  
50 identified as a problem by several trainees in the free-text part of the survey. One  
51 explained how appropriate support and supervision was the main barrier to her  
52 further developing skills learnt on a TNE course, whilst another expressed that  
53 Consultant support was essential but not currently present on her unit. Other  
54 identified barriers to accessing training included time and the perception that TNE is  
55 more difficult to learn and practice than other neonatal skills.  
56  
57

58  
59 The authors recognise the likelihood that trainees interested in TNE were more likely  
60 to respond to this survey. Despite this, the results demonstrate that interested

1  
2  
3 trainees are motivated to access a formal, structured TNE training programme. The  
4 programme should contain a mixture of virtual and in-person elements and present  
5 an opportunity for trainees to be assessed and critiqued. Appropriate supervision in  
6 developing TNE skills has been highlighted as a potential barrier to learning. Similar  
7 local projects could lead to deanery collaborations and a refined national syllabus,  
8 promoting the importance of expertise in TNE within the specialty.  
9  
10

11  
12 **Contributors:** NVS conceptualised the study. The survey was designed by AJC and  
13 NVS. The methodology and data collection were completed by AJC. The manuscript  
14 was written by AJC and edited by NVS.  
15

16  
17 **Funding:** This research received no specific grant from any funding agency in the  
18 public, commercial or not-for-profit sectors  
19

20  
21 **Competing Interests:** None  
22

23 **Patient and public involvement:** There was no patient or public involvement in this  
24 study  
25

26  
27 **Patient consent for this study:** Not applicable  
28  
29  
30  
31

## 32 **References**

- 33  
34 1. Singh Y, Gupta S, Groves AM, et al. Expert consensus statement 'Neonatologist-  
35 performed Echocardiography (NoPE)'-training and accreditation in UK. *Eur J Pediatr.*  
36 2016;175(2):281-287.  
37  
38 2. de Boode, W., Singh, Y., Gupta, S. *et al.* Recommendations for neonatologist  
39 performed echocardiography in Europe: Consensus Statement endorsed by  
40 European Society for Paediatric Research (ESPR) and European Society for  
41 Neonatology (ESN). *Pediatr Res*, 2016;80:465–471.  
42  
43 3. Mertens, L., Seri, I., Marek, J. *et al.* Targeted neonatal echocardiography in the  
44 neonatal intensive care unit: practice guidelines and recommendations for training:  
45 writing group of the American Society of Echocardiography (ASE) in collaboration  
46 with the European Association of Echocardiography (EAE) and the Association for  
47 European Pediatric Cardiologists (AEPC). *European Journal of*  
48 *Echocardiography*, 2011;12(10):715-736.  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Targeted neonatal echocardiography training: a survey of trainees in a region of England. Survey questions.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**1. Which of the following would best describe your current level of experience with targeted neonatal echocardiography (TNE)? Please select all that apply to you.**

- I have no experience with TNE
- I've attended a neonatal/paediatric echo course
- I've had some informal echo teaching during my training (opportunistic cot-side teaching etc.)
- I can acquire a few basic images
- I can acquire all necessary images
- I can acquire all necessary images and interpret them under supervision
- I scan regularly and feel confident interpreting my images

**2. On a scale from 1 (Not at all) to 5 (Definitely) - Is TNE a skill you wish to learn/develop as a neonatal grid trainee?**

- 1
- 2
- 3
- 4
- 5

**3. If you do not wish to learn and practise TNE, can you tell us why?**

**4. On a scale from 1 (Not at all) to 5 (Definitely) - Do you think TNE training should be a compulsory element of the neonatal sub-specialty curriculum?**

- 1
- 2
- 3
- 4
- 5

**5. On a scale from 1 (Not at all) to 5 (Definitely) - Would you find a formal, structured TNE training programme useful as a neonatal grid trainee?**

- 1
- 2
- 3
- 4
- 5

**6. On a scale from 1 (Not at all) to 5 (Definitely) - Would you be willing to pay for a formal TNE training programme/package or have it taken from your study leave allowance?**

- 1
- 2
- 3
- 4
- 5

**7. How do you see the theory elements of a TNE training programme being delivered? Please select as few/many as you feel appropriate.**

- Online modules that I complete at my own pace
- Live online/virtual small group lectures with the opportunity for interaction
- In-person lectures/tutorials
- A paper-based workbook

**8. How do you see the practical elements of a TNE training programme being taught? Please select as few/many as you feel appropriate.**

- Online module(s) that I complete at my own pace – I'd practice in my own time
- Teaching sessions using an echo simulator under supervision
- Small group face-to-face teaching at the cot-side with an opportunity to practice what we've just seen demonstrated
- One-to-one teaching at the cot-side with an opportunity to practice what we've just seen demonstrated

**9. Which of the following (if any) do you see as forming part of the assessment element of a TNE training programme? Please select as many/few as you feel appropriate.**

- Quizzes/questions during or after each theory module
- Echo image interpretation quizzes
- Scan images reviewed and critiqued by a supervisor



**Targeted neonatal echocardiography training: a survey of trainees in a region of England. Survey questions.**

- Having your own scans observed by a supervisor
- A written and practical examination at the end of the training programme
- I would not want to be assessed in any way

**10. On a scale from 1 (Not at all) to 5 (Definitely) - Would you be willing to travel (within your deanery) to access a TNE training programme?**

- 1
- 2
- 3
- 4
- 5

**11. On a scale from 1 (Not at all) to 5 (Definitely) - would you be willing to travel outside of your deanery to access some (or all) of a TNE training programme?**

- 1
- 2
- 3
- 4
- 5

**12. Is there anything else you'd like to tell us about your views on TNE training and what you think should be included in a TNE training programme? Any other thoughts about how such a programme could be delivered? Would you like to expand on any of the answers you've already given us?**

For Review Only

# BMJ Paediatrics Open

## Targeted neonatal echocardiography training: a survey of trainees in a region of England

Journal:	<i>BMJ Paediatrics Open</i>
Manuscript ID	bmjpo-2022-001465.R2
Article Type:	Original research letter
Date Submitted by the Author:	08-Apr-2022
Complete List of Authors:	Cleator, Alexander; Liverpool Women's Hospital, Department of Neonatal Medicine Subhedar, Nimish; Liverpool Women's Hospital, Department of Neonatal Medicine
Keywords:	Neonatology, Cardiology, Qualitative research

SCHOLARONE™  
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1  
2  
3 Targeted neonatal echocardiography training: a survey of trainees in a region of  
4 England  
5  
6  
7

8 Alexander James Cleator<sup>1</sup>, Nimish Vasant Subhedar<sup>1</sup>  
9

10  
11 **Author affiliations:**  
12

13 <sup>1</sup>Department of Neonatal Medicine, Liverpool Women's Hospital, Liverpool, UK  
14  
15

16  
17 **Correspondence:**  
18

19 Alexander James Cleator, Department of Neonatal Medicine, Liverpool Women's  
20 Hospital, Crown Street, Liverpool, L8 7SS, UK. E-mail: [acleator@doctors.org.uk](mailto:acleator@doctors.org.uk)  
21  
22

23  
24 **Key words:**  
25

26 Echocardiography; colour doppler echocardiography; neonatal intensive care;  
27 postgraduate medical education;  
28  
29

30  
31 **Word Count:**  
32

33 616  
34  
35

36  
37 **Reference Count:**  
38

39 3  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Abstract

Targeted neonatal echocardiography (TNE) is an important skill to advise diagnosis and management. Training in TNE is currently optional for neonatal subspecialty (grid) trainees and accessing training is often challenging. We disseminated a survey, asking neonatal grid trainees for their views on TNE training. 48 out of 91 trainees (53%) completed the survey. 96% of trainees (n=48) wanted to learn TNE with similar numbers eager to access a formal training package, utilising a variety of teaching media. Identified barriers to TNE training included time, access to supervision and the perceived complexity of the skill. These findings will influence the design and delivery of a regional TNE training programme.

Confidential: For Review Only

1  
2  
3 Targeted neonatal echocardiography (TNE) is an increasingly utilised skill in the care  
4 of the unwell newborn and premature baby. Expert consensus statements exist in  
5 the UK,[1] Europe[2] and the USA[3] which outline suggested requirements for  
6 developing proficiency in TNE, including the need for paediatric cardiology and  
7 neonatology placements during training and practical guidance on scanning,  
8 reporting and referral to a cardiologist. These statements differ in their  
9 recommendations and there remains a lack of a formal TNE syllabus and access to  
10 appropriate accredited training opportunities.  
11  
12

13  
14 We are considering developing a TNE curriculum and training package, to be  
15 delivered to neonatal grid trainees during their subspecialty training in the region. We  
16 sought to obtain the views of current trainees about TNE, their desire for formal  
17 training and what elements they considered important in a proposed training  
18 package. We identified potential participants from a North of England neonatal  
19 trainees' education group which was established during the coronavirus pandemic  
20 and meets virtually for educational activities on a regular basis. The group is  
21 comprised of neonatal trainees from 6 different deanery training programmes. The 2  
22 authors developed an original online survey (appendix 1), comprising a mixture of  
23 Likert scale, multiple choice and free text questions. The survey was distributed to 91  
24 neonatal grid trainees. The response rate was 53%, with 48 trainees responding.  
25 The process made trainees aware that their survey responses would be used as  
26 data for this project.  
27  
28

29  
30 Our data demonstrated that 96% (46/48) of the responding trainees want to learn  
31 and develop TNE as a skill, with 94% (45/48) of them highlighting that a formal  
32 training programme would be welcomed. 96% of these trainees would be willing to  
33 fund such a programme from their study leave budgets and all of them would be  
34 willing to travel within their local deanery to access training. Over half of the trainees  
35 (56% (27/48)) felt very strongly about TNE, expressing that a formal training  
36 programme should be considered a compulsory element of sub-speciality training.  
37  
38

39 We explored trainees' views on how such a programme would be delivered. Online  
40 modules and virtual small group sessions were favoured against in-person lectures  
41 and tutorials to cover the theoretical elements of TNE. The option of a paper-based  
42 workbook was appealing to only 17% (8/48) of trainees. Small group cot-side  
43 teaching was preferred over one to one teaching for the practical elements of the  
44 course and 77% (37/48) of surveyed trainees expressed that an echo simulator  
45 would aid in learning and development of skills.  
46  
47

48 All trainees agreed that some form of assessment would be required during a  
49 training programme with 90% (43/48) of trainees suggesting that their images should  
50 be critiqued by an assigned supervisor. Accessing appropriate supervision was  
51 identified as a problem by several trainees in the free-text part of the survey. One  
52 explained how appropriate support and supervision was the main barrier to her  
53 further developing skills learnt on a TNE course, whilst another expressed that  
54 Consultant support was essential but not currently present on her unit. Other  
55 identified barriers to accessing training included time and the perception that TNE is  
56 more difficult to learn and practice than other neonatal skills.  
57  
58  
59  
60

1  
2  
3 The authors recognise the likelihood that trainees interested in TNE were more likely  
4 to respond to this survey. Despite this, the results demonstrate that interested  
5 trainees are motivated to access a formal, structured TNE training programme. The  
6 programme should contain a mixture of virtual and in-person elements and present  
7 an opportunity for trainees to be assessed and critiqued. Appropriate supervision in  
8 developing TNE skills has been highlighted as a potential barrier to learning. Similar  
9 local projects could lead to deanery collaborations and a refined national syllabus,  
10 promoting the importance of expertise in TNE within the specialty.  
11  
12  
13

14  
15 **Contributors:** NVS conceptualised the study. The survey was designed by AJC and  
16 NVS. The methodology and data collection were completed by AJC. The manuscript  
17 was written by AJC and edited by NVS.  
18

19  
20 **Funding:** This research received no specific grant from any funding agency in the  
21 public, commercial or not-for-profit sectors  
22

23 **Competing Interests:** None  
24

25 **Patient and public involvement:** There was no patient or public involvement in this  
26 study  
27

28 **Patient consent for this study:** Not applicable  
29  
30  
31  
32  
33

### 34 **References**

- 35  
36  
37 1. Singh Y, Gupta S, Groves AM, et al. Expert consensus statement 'Neonatologist-  
38 performed Echocardiography (NoPE)'-training and accreditation in UK. *Eur J Pediatr.*  
39 2016;175(2):281-287.  
40  
41 2. de Boode, W., Singh, Y., Gupta, S. *et al.* Recommendations for neonatologist  
42 performed echocardiography in Europe: Consensus Statement endorsed by  
43 European Society for Paediatric Research (ESPR) and European Society for  
44 Neonatology (ESN). *Pediatr Res*, 2016;80:465–471.  
45  
46 3. Mertens, L., Seri, I., Marek, J. *et al.* Targeted neonatal echocardiography in the  
47 neonatal intensive care unit: practice guidelines and recommendations for training:  
48 writing group of the American Society of Echocardiography (ASE) in collaboration  
49 with the European Association of Echocardiography (EAE) and the Association for  
50 European Pediatric Cardiologists (AEPC). *European Journal of*  
51 *Echocardiography*, 2011;12(10):715-736.  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Targeted neonatal echocardiography training: a survey of trainees in a region of England. Survey questions.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**1. Which of the following would best describe your current level of experience with targeted neonatal echocardiography (TNE)? Please select all that apply to you.**

- I have no experience with TNE
- I've attended a neonatal/paediatric echo course
- I've had some informal echo teaching during my training (opportunistic cot-side teaching etc.)
- I can acquire a few basic images
- I can acquire all necessary images
- I can acquire all necessary images and interpret them under supervision
- I scan regularly and feel confident interpreting my images

**2. On a scale from 1 (Not at all) to 5 (Definitely) - Is TNE a skill you wish to learn/develop as a neonatal grid trainee?**

- 1
- 2
- 3
- 4
- 5

**3. If you do not wish to learn and practise TNE, can you tell us why?**

**4. On a scale from 1 (Not at all) to 5 (Definitely) - Do you think TNE training should be a compulsory element of the neonatal sub-specialty curriculum?**

- 1
- 2
- 3
- 4
- 5

**5. On a scale from 1 (Not at all) to 5 (Definitely) - Would you find a formal, structured TNE training programme useful as a neonatal grid trainee?**

- 1
- 2
- 3
- 4
- 5

**6. On a scale from 1 (Not at all) to 5 (Definitely) - Would you be willing to pay for a formal TNE training programme/package or have it taken from your study leave allowance?**

- 1
- 2
- 3
- 4
- 5

**7. How do you see the theory elements of a TNE training programme being delivered? Please select as few/many as you feel appropriate.**

- Online modules that I complete at my own pace
- Live online/virtual small group lectures with the opportunity for interaction
- In-person lectures/tutorials
- A paper-based workbook

**8. How do you see the practical elements of a TNE training programme being taught? Please select as few/many as you feel appropriate.**

- Online module(s) that I complete at my own pace – I'd practice in my own time
- Teaching sessions using an echo simulator under supervision
- Small group face-to-face teaching at the cot-side with an opportunity to practice what we've just seen demonstrated
- One-to-one teaching at the cot-side with an opportunity to practice what we've just seen demonstrated

**9. Which of the following (if any) do you see as forming part of the assessment element of a TNE training programme? Please select as many/few as you feel appropriate.**

- Quizzes/questions during or after each theory module
- Echo image interpretation quizzes
- Scan images reviewed and critiqued by a supervisor



**Targeted neonatal echocardiography training: a survey of trainees in a region of England. Survey questions.**

- Having your own scans observed by a supervisor
- A written and practical examination at the end of the training programme
- I would not want to be assessed in any way

**10. On a scale from 1 (Not at all) to 5 (Definitely) - Would you be willing to travel (within your deanery) to access a TNE training programme?**

- 1
- 2
- 3
- 4
- 5

**11. On a scale from 1 (Not at all) to 5 (Definitely) - would you be willing to travel outside of your deanery to access some (or all) of a TNE training programme?**

- 1
- 2
- 3
- 4
- 5

**12. Is there anything else you'd like to tell us about your views on TNE training and what you think should be included in a TNE training programme? Any other thoughts about how such a programme could be delivered? Would you like to expand on any of the answers you've already given us?**

For Review Only