

Article title: Growth of Targeted Neonatal Echocardiography in Chinese Neonatal Intensive Care Units: Gaps in Practice and Training

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e File: Questionnaire Appendix

Section 1: Demographics of neonatologists and characteristics of NICU

1. What is the bed number of the level III and IV NICU in your center?

☐ <40 ☐ 40-80 ☐ 80-120 ☐ >120

2. What is the patient's volume in your center, regarding the number of VLBWI per year?

☐ <25 ☐ 26-50 ☐ 51-75 ☐ 76-100 ☐ >100

3. How many years have you practiced independently as neonatologist?

☐ <2 ☐ 2-5 ☐ 5-10 ☐ >10

4. Is your center caring for outborn or inborn neonates?

☐ Outborn ☐ Inborn ☐ Both

5. How many deliveries occur per year at your institution, if there is OB department in your center?

☐ <2000 ☐ 2000–4000 ☐ 4000– 6000 ☐ >6000

6. What medical care does your center provide? (Check all that apply)

☐ High frequency oscillatory ventilation ☐ Exchange transfusion ☐ ECMO ☐ NiHFO ☐ Donor breast milk ☐ Intestinal surgery ☐ Thoracic tube placement ☐ Congenital diaphragmatic hernia surgery ☐ Regional transport for critical neonates ☐ iNO

7. Is there pediatric cardiology on site in your center?

☐ Yes ☐ No

8. Is there echocardiographic laboratory in your center?

☐ Yes ☐ No

9. Is evening or weekend cardiology service available in your center?

☐ Yes ☐ No

10. How soon are the urgent echocardiographic studies reported for critically ill neonates needing cardiovascular support? (Check all that apply)

- ☐ Within 6 hours of completion
- ☐ Within 24 hours of completion
- ☐ After 24 hours of completion
- ☐ Verbal reports available and useful

Section 2: Practice and infrastructure of targeted neonatal echocardiography (TnEcho)

11. Do you have a dedicated echocardiography machine for the NICU or share with cardiology department? (If dedicated, please go to question 12)

- ☐ Dedicated ☐ Shared

12. What techniques does the echocardiographic equipment for the NICU have? (Check all that apply)

- ☐ High frequency probes (> 7 MHz) ☐ B-mode (2D) ☐ M-mode ☐ Pulse wave doppler
- ☐ Continuous wave doppler ☐ Tissue doppler ☐ Electrocardiogram tracing

13. Does your center use TnEcho in clinical practice? (if yes, go to question 14-38, if No go to question 39)

- ☐ Yes ☐ No

14. How long has your center been using TnEcho?

- ☐ < 2 years ☐ 2-4 years ☐ >4 years

15. Who performs the bedside functional echo in your unit? (Check all that apply)

- ☐ Neonatologist ☐ Sonographer ☐ Pediatric cardiologist

16. If TnEcho is practiced in your NICU, what factors influenced the use of TnEcho? (Check all that apply)

- ☐ Prefer using cardiac sonographic information in conjunction with clinical information to tailor appropriate therapy
- ☐ Literature suggests it contributes to improved patient outcomes

- ☐ Worked in units where it is routinely practiced
- ☐ Pediatric cardiology services not readily accessible
- ☐ Information available from pediatric cardiology echocardiograms not very useful for hemodynamics
- ☐ Extended from POCUS practice

Section 3: Indications for TnEcho

17. What are the indications for which TnEcho is done in your unit? (Check all that apply)

- ☐ Evaluation of a hemodynamically significant ductus arteriosus
- ☐ Evaluation of systemic blood flow
- ☐ Evaluation of pulmonary hemodynamics
- ☐ Evaluation of response to therapy (e.g., inotropes)
- ☐ Line position
- ☐ Sudden unexplained cardiorespiratory deterioration

18. TnEcho is useful for determining whether a patent ductus arteriosus is hemodynamically significant.

- ☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

19. TnEcho is useful for the assessment of systemic blood flow.

- ☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

20. TnEcho is useful for facilitating choice of inotropes or other cardiovascular intervention (e.g., volume) and assessing response to intervention.

- ☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

21. TnEcho is useful for the evaluation of pulmonary hemodynamics.

- ☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

22. TnEcho is useful for facilitating whether to commence inhaled nitric oxide and assessment of response to intervention.

☐ Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree

23. When a medical treatment decision is initiated based on the information obtained from TnEcho study, how frequently is a pediatric cardiologic scan required before treatment?

☐ Always ☐ Most often ☐ Half the time ☐ Infrequently ☐ Never

24. How are the echocardiograms acquired by the neonatologists archived? (Check all that apply)

☐ Archived in the unit on the machine ☐ Archived in the unit on storage hard drive ☐ Archived in cardiology department hard drive ☐ Archived as hard copy printouts ☐ Not archived

25. How are the echocardiograms acquired by the neonatologists reported? (Check all that apply)

☐ By neonatologists as a written note ☐ By neonatologists as an electronic report ☐ By cardiologists as a written note ☐ By cardiologists as an electronic report

26. Do you personally perform any TnEcho study? (If yes please go to question 27-29, if no please go to question 30)

☐ Yes ☐ No

27. How many functional echocardiographic studies do you perform every month?

☐ <10 ☐ 11– 20 ☐ >20

28. Do you use TnEcho for research?

☐ Yes ☐ No

29. If yes, what component of research is addressed? (Check all that apply)

☐ Basic/translational ☐ Clinical/patient-related research

30. What echocardiographic parameters are used to evaluate left ventricular systolic function in your center if TnEcho is practiced?

☐ Eye-balling ☐ Fraction shortening ☐ Ejection fraction (simpson biplane) ☐ Strain ☐ Left ventricular output (LVO) ☐ Superior vena cava flow (SVCf) ☐ None of the above

31. What echocardiographic parameters are used to evaluate left ventricular diastolic function in your center if TnEcho is practiced?

☐ Left atrium dimension ☐ Mitral E- and A-wave velocity and E/A ratio ☐ Pulmonary veins flow ☐ Tissue doppler of mitral e' and a' ☐ None of the above

32. What echocardiographic parameters are used to evaluate the right ventricular function in your center if TnEcho is practiced?

☐ Eye-balling of RV size ☐ Tricuspid annular plane systolic excursion (TAPSE) ☐ Right ventricular output (RVO) ☐ Fractional area change (FAC) ☐ Strain ☐ None of the above

33. What echocardiographic parameters are used to evaluate the hemodynamic significance of PDA in your center if TnEcho is practiced?

☐ Size of the duct arteriosus ☐ Pulse doppler of ductal flow ☐ Velocity in systole and diastole of the ductal flow ☐ Left ventricular output (LVO) ☐ Ratio of LA : Ao ☐ Pulmonary vein velocity ☐ IVRT ☐ Pulse doppler of MCA, AAO and celiac artery ☐ Fraction shortening ☐ Eyeballing of LV size ☐ None of the above

34. What echocardiographic parameters are used to evaluate the hemodynamic status of infants with hypoxic respiratory failure in your center if TnEcho is practiced?

☐ The tricuspid regurgitation jet flow velocity ☐ End-systolic interventricular septum shape in parasternal short axis view ☐ Pulmonary artery acceleration time ☐ TAPSE ☐ RVO ☐ FAC ☐ Eyeballing of RV size or RV wall thickness ☐ PA notch ☐ None of the above

35. How often is TnEcho used for checking the position of line placement?

☐ Always ☐ Most often ☐ Half the time ☐ Infrequently ☐ Never

36. In terms of promptness and content of information provided by the TnEcho in your unit, it is best described as appropriate:

☐ 95%– 100% of the time ☐ 70%–95% of the time ☐ 40%–70% of the time ☐ 10%–40% of the time ☐ <10% of the time

Section 4: Training of TnEcho

37. Which of the following best describes the training of the neonatologists who are practicing TnEcho in your unit? (Check all that apply)

- ☐ Taught by a trained neonatologist
- ☐ Self-directed learning
- ☐ Rotated in echo lab and taught by sonographers
- ☐ Rotated in the Dept. Cardiology and taught by pediatric cardiologists
- ☐ Attended workshops
- ☐ Used Web-based tools/books/educational CDs
- ☐ Not applicable

38. How many scans have the neonatologists performed before he/she started practicing TnEcho in your unit?

- ☐ <50
- ☐ 50-100
- ☐ 100- 150
- ☐ 150-200
- ☐ >200

39. What are the barriers to implementing TnEcho in your center?

- ☐ Lack of organized training programs
- ☐ Opposition from Cardiology
- ☐ Lack of echocardiography expertise
- ☐ Medicolegal liability concerns
- ☐ No interest from the neonatologists
- ☐ Lack of equipment
- ☐ Insufficient evidence of benefit
- ☐ Inadequate support from Department
- ☐ Work not reflected in RVUs
- ☐ Inability to bill for the service

39. Is a TnEcho teaching/training courses available at your institution? (If yes, please go to question 41-47, if no, please go to question 48)

- ☐ Yes
- ☐ No

40. If yes, who were interested in attending the teaching/training/workshops? (Check all that apply)

☐ Institution's staff neonatologists ☐ Institution's neonatal fellows ☐ Institution's pediatric residents ☐ Institution's general pediatricians ☐ Other members from interprofessional team (nursing, respiratory therapy) ☐ Trainees from outside institution

42. If yes, are these teaching/training/workshops offered by accreditation organizations or board certification?

☐ Yes ☐ No

43. Which of the following best describes how the teaching/training/workshops are conducted? (Check all that apply)

☐ Didactic component ☐ Hands-on component ☐ Teaching aids (online teaching tools, CDs)
☐ Clinical rotation in echocardiography laboratory ☐ Teaching given by neonatologists only
☐ Teaching given by neonatologists and cardiologists

44. What is provided to the trainee at the end of the teaching/training/workshop?

☐ Certificate of attendance ☐ CME ☐ Certificate of successful completion of the evaluation ☐
None of the above

45. Is there a formal assessment process of skills of TnEcho at the end of teaching/training/workshop?

☐ Yes ☐ No

46. If yes, are trainees required to be successful in this assessment to obtain certification of teaching/training/workshop regarding TnEcho?

☐ Yes ☐ No

47. What form does this assessment take? (Check all that apply)

☐ Practical assessment (trainee observation in performance of echocardiography)
☐ Written examination ☐ Multiple-choice questions ☐ Assessment of logbook

48. Do you think it is essential to have timely and longitudinal echocardiographically derived hemodynamic information to guide cardiovascular therapy in NICU?

☐ Yes ☐ No