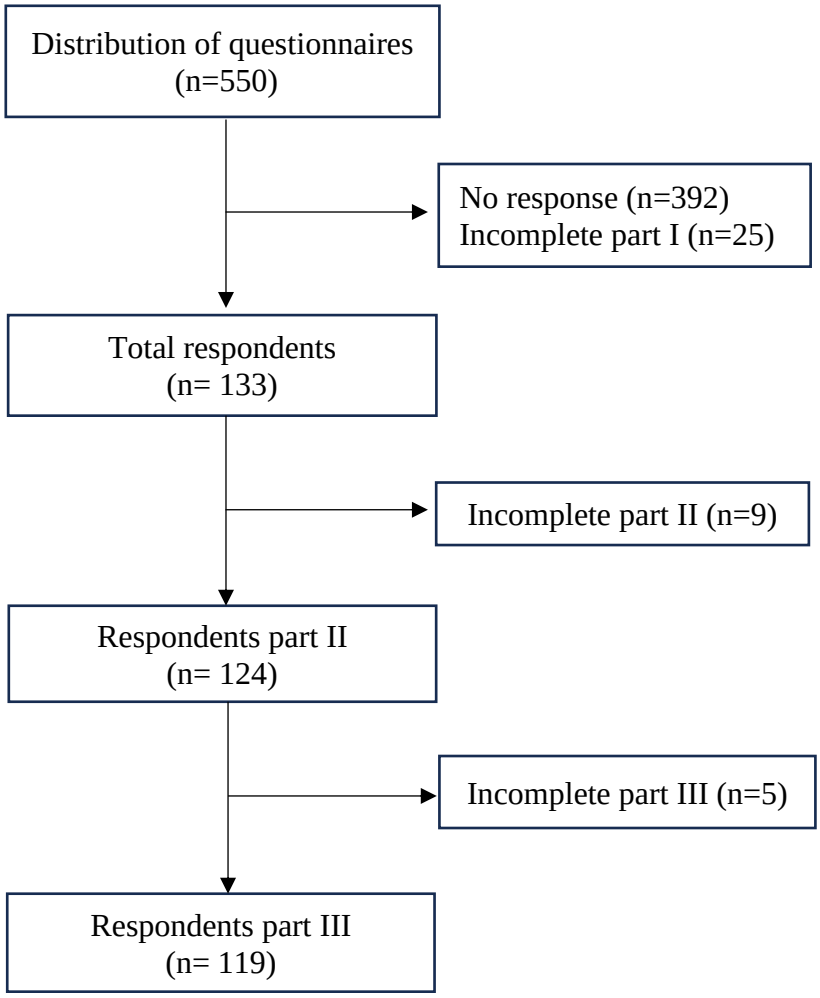
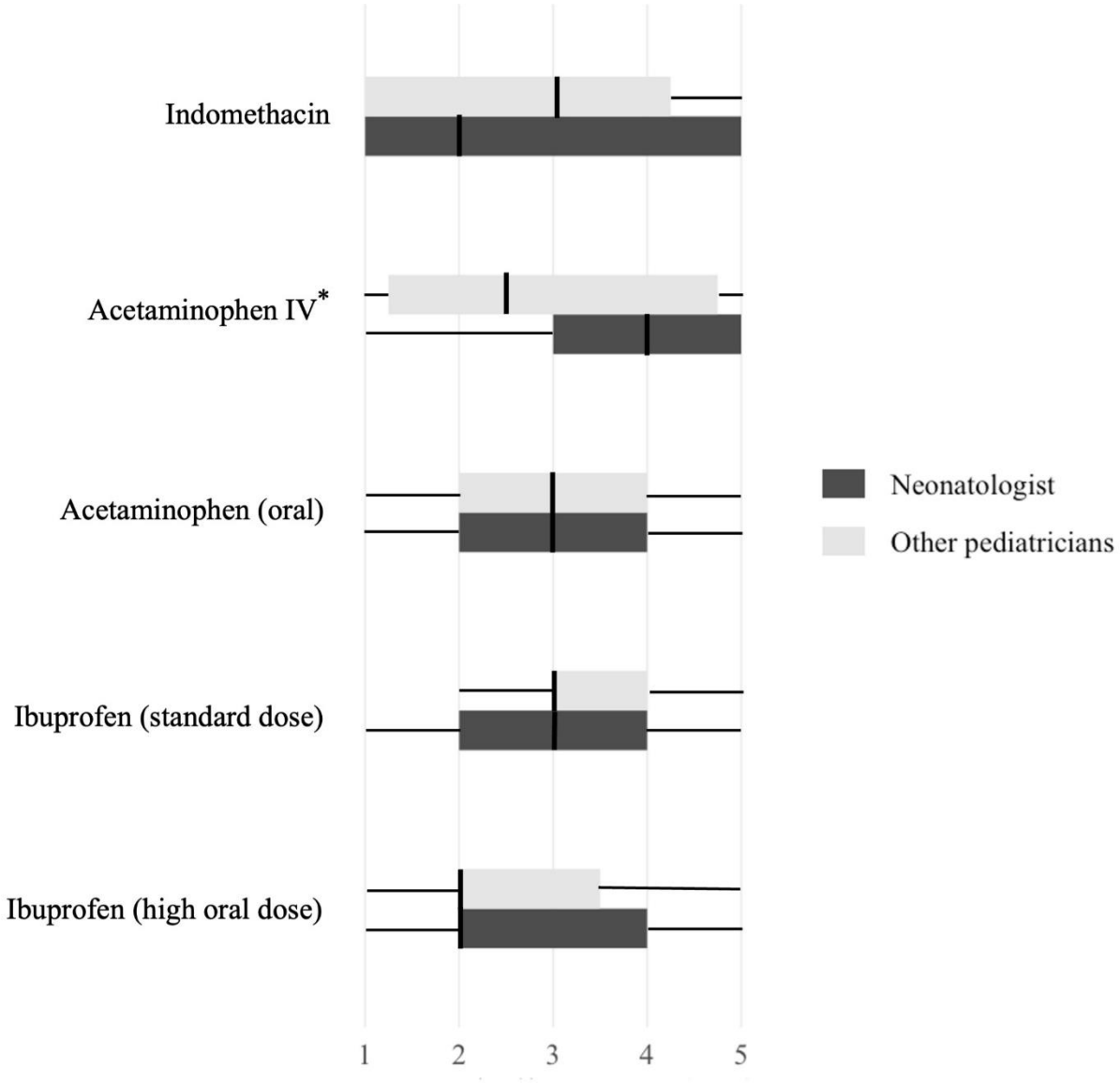
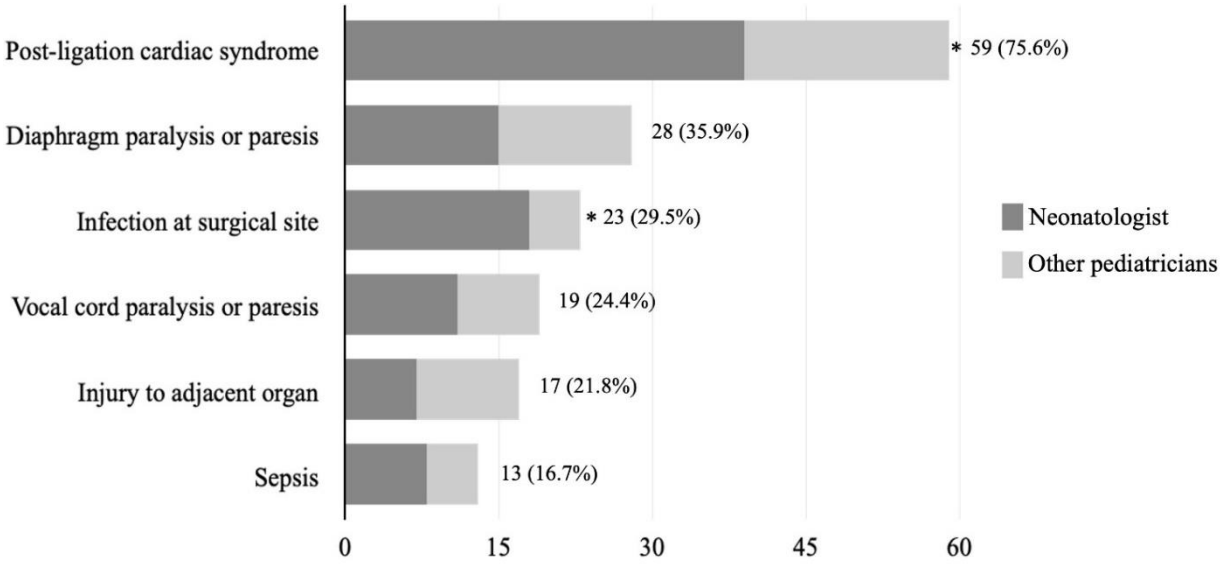


Supplemental Fig. 1 Study Flow
Legend: Part I: respondent demographics; Part II: PDA evaluation; Part III: PDA management



Supplemental Fig. 2 Box plots demonstrating Likert-scale for medication preferences used in attempting accelerated PDA closure. $^{*}p<0.05$ is statistically significant.

Legend: The box plots illustrate the distribution of Likert-scale opinion scores (1–5) for each of items, comparing neonatologists and other pediatricians. The bottom and top of each box represent the 25th and 75th percentiles. The vertical line within each box indicates the median, higher scores indicate stronger agreement with each statement.
Ibuprofen (standard dose): 10 mg/kg/dose on 1st day then 5 mg/kg/dose on 2nd and 3rd days
Ibuprofen (high oral dose): 15-20 mg/kg/dose on 1st day then 7.5-10 mg/kg/dose on 2nd and 3rd days
Abbreviations: IV; intravenous, PDA; patent ductus arteriosus **.**



Supplemental Fig. 3 Post PDA Ligation Complications

Legend: A total of 78 respondents were included (47 neonatologists and 31 other pediatricians). $^{*}p<0.05$ is statistically significant.

Supplemental Table 1 Clinical Characteristics to Defined hsPDA Among Specialty

Clinical Characteristics	Total (n=124)	Neonatologist (n=63)	Other pediatricians (n=61)	*p*
Heart murmur	123 (99%)	62 (95%)	61 (90%)	0.33
Wide pulse pressure	107 (86%)	59 (91%)	48 (71%)	0.01*
Bounding pulse	98 (79%)	53 (82%)	45 (66%)	0.07
Cardiomegaly	87 (70%)	49 (75%)	38 (56%)	0.03*
Pulmonary hemorrhage	80 (65%)	50 (77%)	30 (44%)	<0.001*
Respiratory distress	74 (60%)	39 (60%)	35 (52%)	0.42
Pulmonary edema	70 (57%)	37 (57%)	33 (49%)	0.43
Tachycardia	56 (45%)	33 (51%)	23 (34%)	0.07
Low DBP	53 (43%)	31 (48%)	22 (32%)	0.10
Increasing FiO_2	52 (42%)	40 (62%)	12 (18%)	<0.001*
Hyperactive precordium	47 (38%)	32 (49%)	15 (22%)	0.002*
Feeding intolerance	29 (23%)	19 (29%)	10 (15%)	0.07
Renal impairment	29 (23%)	22 (34%)	7 (10%)	0.002*
Hypotension	27 (22%)	16 (25%)	11 (16%)	0.32
CPAP failure	27 (22%)	20 (31%)	7 (10%)	0.01*
Extubation failure	24 (19%)	17 (26%)	7 (10%)	0.03*

Data are presented as n (%), *$p<0.05$ is statistically significant

Abbreviations: CPAP; continuous positive airway pressure, DBP; diastolic blood pressure, FiO_2; Fractional inspired oxygen, hsPDA, hemodynamic significant patent ductus arteriosus.

Supplemental Table 2 Cut-off value of echocardiographic parameter defining hsPDA among Neonatologist and Non-neonatologist.

Echocardiographic parameter	Group		n (%)	*p*
PDA diameter	Neonatologist	Cut-off	30 (56%)	0.002*
		Uncertain	24 (44%)	
	Other pediatricians	Cut-off	12 (24%)	
		Uncertain	38 (76%)	
LA: Ao ratio	Neonatologist	Cut-off	40 (74%)	0.38
		Uncertain	14 (26%)	
	Other pediatricians	Cut-off	14 (61%)	
		Uncertain	9 (39%)	

Data are presented as n (%), *$p<0.05$ is statistically significant
Abbreviations: Ao; aortic valve, hsPDA; hemodynamic significant patent ductus, LA; left atrium.

Supplemental Table 3 Cut-off echocardiographic parameter defined hsPDA.

Echocardiographic parameters	Group	Median [IQR]	*p*
PDA diameter (mm)	Neonatologist	1.5 [1.5, 2.5]	0.26
	Other pediatricians	2 [1.5, 2]	
LA:Ao ratio	Neonatologist	1.5 [1.5, 1.5]	0.99
	Other pediatricians	1.5 [1.4, 1.5]	

Data are presented as median [IQR], *$p<0.05$ is statistically significant
Abbreviations: hsPDA: Hemodynamically significant patent ductus arteriosus**;** PDA: Patent Ductus Arteriosus; LA: left atrium; Ao: aortic valve

Supplemental Table 4 Timing for PDA ligation among neonatologists and other pediatricians

Timing for PDA ligation	Neonatologist (n=61)	Other pediatricians (n=57)	*p*
After 1 course of medication	3 (5%)	9 (16%)	0.05
After 2 courses of medication	47 (77%)	41 (72%)	0.60
After 3 courses of medication	6 (10%)	3 (5%)	0.49
After more than 3 courses of medication	5 (8%)	4 (7%)	1

Legend: Each cycle equals the standard recommendation for each medication, e.g., ibuprofen for 3 days equals 1 course

Data are presented as n (%), $^{*}p<0.05$ is statistically significant

Abbreviation: PDA; patent ductus arteriosus

Supplemental Table 5 Timing to do echocardiography for follow-up after success PDA closure among Neonatologist (n=36) and Non-neonatologist (n=30)

	Groups	Median [IQR]	*p*
PMA (weeks)	Neonatologist	36 [34, 37]	0.04*
	Other pediatricians	37 [36, 40]	
Chronological days	Neonatologist	3.5 [1.75,7]	0.08
	Other pediatricians	7 [4.75, 14.8]	

Data are presented as median [IQR], $^{*}p<0.05$ is statistically significant

Abbreviations**:** PDA; patent ductus arteriosus, PMA; post menstrual age

Survey on the Current Practice for Patent Ductus Arteriosus (PDA) in preterm infant among Pediatricians

Part 1: Respondent demographics

1. Your specialization
   - ❑ Pediatric Fellowship (Specify Subspecialty): .....
   - ❑ General Pediatrician
   - ❑ Neonatologist
   - ❑ Pediatric Cardiologist
   - ❑ Other Pediatric Subspecialties (Specify): .....

2. Your Age
   - ❑ 25-30 years ❑ 31-40 years ❑ 41-50 years
   - ❑ 51-60 years ❑ > 60 years

3. How long have You worked as a pediatrician?
   - ❑ 0-5 years ❑ 5-10 years ❑ 10-15 years
   - ❑ 15-20 years ❑ More than 20 years

4. Which level of you current hospital is?
   - ❑ University Hospital
   - ❑ Medical Education Center
   - ❑ Provincial Hospital (Tertiary Care Level)
   - ❑ General Hospital (Secondary Care Level)
   - ❑ Private Hospital

5. Does your hospital or the hospital you will return to after completing your subspecialty training have a Pediatric Intensive Care Unit (PICU)?
   - ❑ Yes (Answer question 5.1)
   - ❑ No

   5.1 Characteristics of the Pediatric Intensive Care Unit
   - ❑ NICU and PICU are separate
     Please specify the number of NICU beds: ..... beds
   - ❑ NICU and PICU are combined
     Please specify the number of NICU beds: ..... beds
   - ❑ NICU, PICU, and adult ICU are combined
     Please specify the number of NICU beds: ..... beds

6. Capability of Neonatal Care in Your Hospital

   6.1 Able to care for newborns with intubation

   ❑ Yes ❑ No

6.2 Able to care for preterm infants weighing less than 1500 grams

❑ Yes ❑ No

6.3 Able to care for preterm infants weighing less than 1000 grams

❑ Yes ❑ No

7. In your hospital, How many Newborns Admitted to NICU per Year?

❑ < 30 per year ❑ 31-50 per year ❑ 51-100 per year
❑ 101-150 per year ❑ 151-200 per year ❑ > 200 per year

8. In your hospital, How many Newborns Diagnosed with PDA per Year

❑ < 5 ❑ 5-10 ❑ 11-15
❑ 15-20 ❑ 21-25 ❑ 26-30
❑ > 30

9. Capability of Diagnosing and Treating PDA in Your Hospital

❑ A pediatric cardiologist is available at the hospital.

❑ A pediatric cardiologist is not available at the hospital, but there is a part-time or consultant pediatric cardiologist.

❑ A pediatric cardiologist who can perform PDA device closure is available.

❑ A thoracic surgeon who can perform PDA ligation is available.

10. Does your hospital have guidelines for the management of PDA?

❑ Yes ❑ No

If yes, these guidelines have been in use for ..... years

Part 2: PDA evaluation

1. Does your NICU perform "routine echocardiography" for preterm infants to assess cardiac function and/or PDA? (*"Routine echocardiography" refers to the screening of cardiac performance and PDA status in newborns who do not yet exhibit any specific symptoms or signs.*)

❑ Yes (Proceed to questions 1.1 – 1.3)

❑ No (Proceed to question 2)

1.1 At what gestational age does routine echocardiography start?

❑ < 29 weeks ❑ < 32 weeks ❑ < 37 weeks

1.2 Please specify the personnel who perform routine echocardiography:

❑ Neonatologists who can perform echocardiography

❑ Pediatric Cardiologists

❑ Ultrasound Sonographers

❑ Other (Specify): .....

1.3 At what age is echocardiography performed for PDA screening?

❑ < 12 hours after birth ❑ 12-24 hours after birth
❑ 24-72 hours after birth ❑ > 72 hours after birth
❑ Other (Specify): .....

2. Symptoms that lead you to suspect PDA and perform echocardiography (select more than one answer is acceptable):
   - ❑ Heart murmur ❑ Wide pulse pressure ❑ Low diastolic pressure
   - ❑ Bounding pulse ❑ Hypotension ❑ Tachycardia
   - ❑ Respiratory distress ❑ CPAP failure
   - ❑ Cardiomegaly by CXR ❑ Feeding intolerance
   - ❑ Pulmonary edema ❑ Renal impairment/oliguria ❑ Hyperactive precordium
   - ❑ Extubation failure ❑ Pulmonary hemorrhage ❑ Increased FiO2

3. How does your hospital or your practice manage PDA in newborns?
   - ❑ Expectant management for all cases (no medication to promote PDA closure)
   - ❑ Medical closure for all or most cases of PDA
   - ❑ Selective management (If selected, please proceed to question 3.1)

   3.1 What criteria do you use to decide on medication to promote PDA closure? (select more than one answer is acceptable)
   - ❑ Gestational age ❑ Postmenstrual age (PMA) ❑ Respiratory support
   - ❑ Cardiomegaly from CXR
   - ❑ Other (Specify): .....

4. Parameters that you used to assess PDA and decide on treatment for hemodynamically significant PDA (HsPDA) (select more than one answer is acceptable), And please provide the cut-off values for large volume shunt that you are use in practice
   - ❑ PDA diameter (mm)
     Cut-off: ..... ❑ Not sure
   - ❑ PDA diameter indexed to weight (mm/kg)
     Cut-off: ..... ❑ Not sure
   - ❑ LA ratio
     Cut-off: ..... ❑ Not sure
   - ❑ PDA diameter ratio
     Cut-off: ..... ❑ Not sure
   - ❑ LVO (ml/kg/min)
     Cut-off: ..... ❑ Not sure

❑ LVO ratio

Cut-off: ..... ❑ Not sure

❑ Transductal flow pattern (Specify): .....

❑ Transductal flow velocity (Vmax) (m/s)

Cut-off: ..... ❑ Not sure

❑ LPA diastolic velocity (m/s)

Cut-off: ..... ❑ Not sure

❑ LVEDD (mm)

Cut-off: ..... ❑ Not sure

❑ Mitral valve E ratio

Cut-off: ..... ❑ Not sure

❑ Mitral valve E (cm/s)

Cut-off: ..... ❑ Not sure

❑ LV-IVRT (ms)

Cut-off: ..... ❑ Not sure

❑ LVO ratio

Cut-off: ..... ❑ Not sure

❑ Pulmonary vein D wave (cm/s)

Cut-off: ..... ❑ Not sure

❑ Sign of systemic hypoperfusion: diastolic flow pattern in systemic arteries (e.g., Celiac trunk, SMA, MCA, PCA)

❑ Other (Specify): .....

Note: Ao: aortic valve, IVRT: Isovolumic relaxation time, LA: Left atrium, LPA: Left pulmonary artery, LVEDD: Left ventricular end-diastolic diameter, LVO: Left ventricular outflow, RVO: Right ventricular outflow, SVCf: Superior vena cava flow, SMA: Superior mesenteric artery, MCA: Middle cerebral artery, PCA: Pericallosal artery

5. Do you believe that "routine echocardiography" is beneficial and/or assists in decision-making for treating your newborn patients? Please provide reasons.

❑ Yes

Reasons: .....

❑ No

Reasons: .....

Part 3: PDA management

1. Does you provide prophylactic PDA treatment? (*Prophylactic PDA treatment refers to administering medication to promote PDA closure regardless of echocardiography results in certain groups of infants.*)

❑ Yes (Proceed to questions 1.1 – 1.2) ❑ No

1.1 Criteria for administering prophylactic PDA treatment

❑ GA (Gestational Age) Specify: ..... weeks

❑ BBW (Birth Body Weight) Specify: ..... grams

❑ Other (Specify): .....

1.2 Which medication you used for prophylactic PDA treatment?

❑ Ibuprofen ❑ Indomethacin ❑ Acetaminophen

2. If you decide to treat PDA with medical closure, which first-line medication do you choose? (Select more than one if using two medications simultaneously.)

❑ Ibuprofen

Dose regimen: .....

Duration of treatment (days): …….

Route of administration: ❑ Oral ❑ IV

❑ Indomethacin

Dose regimen: .....

Duration of treatment (days): …….

❑ Acetaminophen

Dose regimen: .....

Duration of treatment (days): …….

Route of administration: ❑ Oral ❑ IV

3. If the first course of medical closure is ineffective, how will you proceed with further treatment?

❑ 2nd course of Ibuprofen

Dose regimen: .....

Duration of treatment (days): …….

Route of administration: ❑ Oral ❑ IV

❑ 2nd course of Acetaminophen

Dose regimen: .....

Duration of treatment (days): …….

Route of administration: ❑ Oral ❑ IV

❑ Consult for surgical closure

4. Please rank your preference or satisfaction with the use of PDA closure medications (1 is most preferred, 5 is least preferred):

…… Ibuprofen high oral dose

…… Ibuprofen standard oral dose

…… Acetaminophen oral

…… Acetaminophen IV

…… Indomethacin

…… Others (Specify):

……

ibuprofen high oral dose: Day 1: 15-20 mg/kg/dose

Day 2: 7.5-10 mg/kg/dose
Day 3: 7.5-10 mg/kg/dose

Ibuprofen standard oral dose: *Day 1: 10 mg/kg/dose*
Day 2: 5 mg/kg/dose
Day 3: 5 mg/kg/dose

5. When do you decide to consult a surgeon or refer the infant for PDA surgery after unsuccessful treatment with PDA closure medication?
    - ❑ After 1 cycle of medication
    - ❑ After 2 cycles of medication
    - ❑ After 3 cycles of medication
    - ❑ After more than 3 cycles of medication

Each cycle equals the standard recommendation for each medication, e.g., ibuprofen for 3 days equals 1 cycle.

6. Do you agree with the following statements?
   5 = Strongly agree 4 = Agree 3 = Unsure 2 = Disagree 1 = Strongly disagree

	5	4	3	2	1
1. Prematurity and PDA commonly occur together and not associated with higher morbidity and mortality.					
2. From statement (1), it can be inferred that PDA does not necessarily need treatment.					
3. From statement (1), it can be inferred that PDA does not necessarily need screening.					
4. PDA is a significant cause of morbidity and mortality in preterm infants.					
5. From statement (4), it can be inferred that screening for PDA should be performed on all preterm infants.					
6. From statement (4), it can be inferred that all cases of PDA should receive treatment.					
7. From statement (4), it can be inferred that PDA should be treated promptly.					
8. From statement (4), it can be inferred that PDA should be closed before preterm infants are discharged home.					
9. PDA diameter is a reliable parameter for deciding on treatment.					
10. Hs-PDA should be treated in all cases.					
11. Non-Hs-PDA should be treated if symptomatic					
12. PDA surgery carries a low risk.					
13. PDA surgery is more suitable for the context of Thailand compared to catheter-based PDA device closure in cases unresponsive to medical treatment.					
14. Targeted Neonatal Echocardiography helps in accurately identifying infants who need PDA treatment and monitoring treatment outcomes.					

7. Do you follow-up after successful closure of PDA?

❏ Yes ❏ No

If yes, follow up at PMA ..... weeks or at day ..... after successful closure

8. Have you encountered any complications from PDA surgery?

❏ Yes (Proceed to question 8.1) ❏ No

8.1 Complications encountered in PDA surgery:

❏ post-ligation cardiac syndrome (Specify symptoms observed):

❏ Hypotension

❏ Persistent desaturation and hypoxemia

❏ Diaphragm paralysis or paresis

❏ Vocal cord paralysis or paresis

❏ Injury to adjacent organs or arteries (e.g., left pulmonary artery, aorta, left main bronchus)

❏ Infection at the surgical site

❏ Sepsis

❏ Other (Specify): .....