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Improving the Management of Hyperbilirubinemia in a Limited-Resource Area

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Chapter 2

Adherence to Hyperbilirubinemia Guidelines by Midwives, General Practitioners, and Pediatricians in Indonesia

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ABSTRACT

Severe hyperbilirubinemia, which may result in kernicterus, is seen more frequently in low and middle-income countries, such as Indonesia, than in high-income countries. In Indonesia midwives, general practitioners (GPs), and pediatricians are involved in the care of jaundiced newborn infants. It is unknown whether the high incidence of severe hyperbilirubinemia in this country is related to a lack of awareness of existing hyperbilirubinemia guidelines issued by, for example, the World Health Organization, the American Academy of Pediatrics, or the Indonesian Health Ministry, or to a lack of adherence to such guidelines.

The aim of this questionnaire study was to assess health professionals' awareness of existing guidelines and their adherence to these guidelines in daily practice. We handed out a ten-question questionnaire to midwives, GPs, and pediatricians that included questions about the professionals themselves as well as clinical questions. The midwives completed 291 questionnaires, the GPs 206, and the pediatricians 154, all of which we used for our analysis.

Almost 30% of the midwives and 23% of the GPs were either unaware of any existing guidelines or they did not adhere to them. Only 54% of the midwives recognized the warning signs of severe hyperbilirubinemia correctly, compared to 68% of the GPs and 89% of the pediatricians. Twenty-eight percent of the midwives and 31% of the GPs indicated that their first follow-up visit was after 72 hours, while 90% of them discharged infants after less than 48 hours after birth. The awareness of and adherence to guidelines for preventing and treating hyperbilirubinemia is low amongst the midwives and GPs in Indonesia. This may be an important contributing factor in the high incidence of severe hyperbilirubinemia in Indonesia.

Introduction

Increased bilirubin levels are commonly seen in newborn infants and it is one of the leading causes for hospitalization during the first week after birth [1±7]. Early diagnosis of hyperbilirubinemia and phototherapy treatment can prevent brain damage, while late diagnosis and inappropriate or ineffective treatment may account for the disproportionately high incidence of bilirubin-induced acute encephalopathy and long-term morbidity seen in low and middle-income countries (4). Worldwide, an estimated 481,000 term infants suffer from severe hyperbilirubinemia annually (5). At least 75% of these infants live in South East Asia, China, and sub-Saharan Africa (5,6). A recent survey in Indonesia indicated that the incidence of severe hyperbilirubinemia, defined as a total serum bilirubin of more than 340 µmol/L (20 mg/dL), is 7%. Acute bilirubin encephalopathy was found in 2% of the infants (7).

In Indonesia, the care of term-born infants during the first week after birth is provided primarily by midwives and general practitioners (GPs). The majority of infants are not born in a hospital, but in an obstetric clinic or at home. Several guidelines for diagnosing and treating hyperbilirubinemia are available in Indonesia. The Indonesian Ministry of Health (IHM) issued a guideline for midwives (8). GPs often use the guideline issued by the World Health Organization (WHO) (9). The Indonesian Pediatric Society advises its members to adhere to the guideline issued by the American Academy of Pediatrics (AAP) (10). A part of the AAP guideline was translated into Bahasa Indonesia, the official language of Indonesia, and issued by the Indonesian Pediatric Collegium, the Board responsible for the education of pediatricians in Indonesia (10). In addition to issuing the guidelines, phototherapy for hyperbilirubinemia was made available in almost the whole of Indonesia. Nevertheless, cases of severe hyperbilirubinemia are still frequently seen. We wondered whether this may be related to health professionals being unaware of the existence of these guidelines or to their failure to adhere to the recommendations contained in them.

With the help of a questionnaire, we investigated awareness of the guidelines in three groups of health professionals involved in the care of newborn infants: midwives, GPs, and pediatricians. We also assessed whether these health professionals adhered to the guidelines in daily practice.

Methods

The study was approved by the Ethical Committee in Health Research of the Dr. Soetomo General Hospital Surabaya (number 390/ Panke.KKE/V/2017). The committee waived the need to ask consent, because data were obtained anonymously by questionnaires. In 2016 we handed out a questionnaire to midwives, GPs, and pediatricians at the end of a postgraduate teaching symposium, not related to hyperbilirubinemia, held by the Indonesian Pediatric Society (PIT IKA VIII Makassar) on East Java, Indonesia. We performed a pilot study by first handing out the questionnaires to 25 midwives, 25 GPs, and 25 pediatricians to check the clarity of the questions, variability, and reliability. The questionnaires for the three groups were identical as far the questions on hyperbilirubinemia were concerned. Only the question relating to the professionals' place of practice was different, as midwives do not work in NICUs. The questionnaire consisted of ten questions. First, we collected demographic background information on the respondents regarding age, number of years of practice, and the number of infants seen per month. This was followed by questions about the professionals' awareness of guidelines on diagnosing and treating hyperbilirubinemia and if so, whether they adhered to the guidelines in practice. For each question the respondents could choose one of the three to five optional answers provided. Only one answer was allowed except in the case of Question 4 (S1 Table). Finally, a clinical case was presented: a 30-year-old mother, with blood group O+, gave birth to a 2.8 kg male infant with cephalic hematoma after 37 weeks of gestation. Before discharge, at 36 hours after birth, the infant appeared jaundiced. I would . . . (choose the one answer that best fits your usual practice) (S1 Table).

Supporting Information

S1 TABLE 1. Questionnaire Neonatal Hyperbilirubinemia Management in East Java Indonesia

(translated into English)

No	Question	Answer *please choose one answer that best describes your practice.
1	What is your profession?	A. Midwife B. General Practitioner C. Pediatrician
	What is your age?	A. ≤ 30 B. 31-39 C. 40-49 D. 50-59 E. ≥ 60
	How many years have you been working in your profession?	A. ≤ 1 B. 2-5 C. 6-10 D. ≥ 10
	Where do you work the most (highest level of NICU or practice)?	A. Nursery B. NICU Level II C. NICU Level III D. Private practice
2	How many newborns do you care for each month on average?	A. ≤ 1 B. 2-5 C. 6-10 D. ≥ 10
3	When do you discharge a healthy term vaginally born newborn, on average (length of stay in hours)?	A. ≤ 24 B. 25-48 C. >48
4	How do you first recognize a newborn with hyperbilirubinemia?	A. Visual: yellow on the hand palms and soles of the feet B. Yellow within < 24 hours of age C. Yellow baby with pale stools, fever D. Yellow color between 24 hours-14 days old, baby active and growing E. Bilirubin level > 10 mg/dl in term infant
5	Do you measure a bilirubin level before discharge?	A. Yes, mostly B. Yes, if the baby look yellow C. No, I will not
6	When do you schedule the first post discharge follow up (hours)?	A. ≤ 24 B. 25-48 C. 49-72 D. >72

No	Question	Answer
		*please choose one answer that best describes your practice.
7	Do you use a specific guideline regarding the management of hyperbilirubinemia?	A. Yes: Please choose the guideline that you usually use: 1) Basic Neonatal Essential Care (Indonesian Health Ministry) 2) Hospital Care for Children WHO 3) American Academy of Pediatrics (AAP) 4) National Institute for Health and Clinical Excellence (NICE) 5) Others, being.... B. No
8	Can you easily access that guideline?	A. Yes, by : 1) Book 2) Online 3) Notes B. No
9	What kind of problems do you encounter the most in the management of hyperbilirubinemia?	A. Education and communication B. Diagnostics C. Therapy D. Facilities
10	A 30 year old mother blood group O ⁺ gave birth to a 2.8 kg male infant after 37 weeks of gestation with cephalic hematoma. Before discharge, at 36 hours of age, the infant appeared jaundiced. I would (chose one answer that fits you practice the best)	A. Discharge the baby and schedule a follow up as an outpatient; B. Ask for lab testing: blood typing, rhesus, coombs and bilirubin level measurement C. Cancel discharge and start phototherapy D. Refer the baby to a pediatrician

Statistics

We present all the data as numbers and percentages. Using IBM SPSS Statistics, Version 21 (Chicago, IL, USA), we tested the differences for all the variables between the groups of health professionals for significance with Pearson's chi-square tests. Probability values of $P < 0.05$ were considered statistically significant.

Results

The questionnaires were handed out to 384 midwives, 250 GPs, and 593 pediatricians. The response rates were 303 (79%), 220 (88%), and 178 (30%), respectively. Of these questionnaires a total of 651 (53%) were filled in completely: 291 by the midwives, 206 by the GPs, and 154 by the pediatricians. We used these questionnaires for further analysis.

Table 1 provides the demographic characteristics of the respondents. The midwives were either employed by obstetric clinics or private practices and they attended deliveries at home. GPs saw newborn infants at their practices, while pediatricians worked in obstetric clinics, hospitals, or in private practices. The midwives and GPs tended to be younger, had fewer years' experience, and saw significantly fewer infants per month compared to the pediatricians ($P < 0.05$ in all three cases).

The AAP guideline was adhered to by 84% of the pediatricians, the WHO guideline by 46% of the GPs, and 54% of the midwives adhered to the IHM guideline (Table 2). Twenty nine percent of the midwives and 23% of the GPs were unaware of a hyperbilirubinemia guideline or they failed to adhere to one. Almost 50% of the pediatricians indicated that they had difficulty gaining access to the guidelines. Only 54% of the midwives named warning signs for severe hyperbilirubinemia correctly (i.e. jaundice less than 24 hours after birth and jaundice to the palms of the hands and the soles of the feet) compared to 68% of the GPs and 89% of the pediatricians ($P < 0.05$).

Table 1. Demographic Characteristics of the Respondents

		Midwives N=291	GPs N=206	Pediatricians N=154	p value*
Age of the respondent (years)	≤ 30	169 (58)	116 (56)	0 (0)	<0.01
	31-39	65 (22)	69 (34)	56 (36)	
	40-49	48 (17)	17 (7)	53 (35)	
	50-59	8 (3)	2 (1)	33 (21)	
	≥ 60	1 (0)	5 (2)	12 (8)	
Years of Practice	≤ 1	39 (13)	25 (12)	9 (6)	<0.01
	2-5	117 (40)	113 (55)	52 (34)	
	6-10	60 (21)	46 (22)	39 (25)	
	≥ 10	75 (26)	22 (11)	54 (35)	
Level of Practice	Nursery	113 (39)	14 (7)	77 (50)	<0.01
	NICU Level II	0 (0)	10 (5)	47 (30)	
	NICU Level III	0 (0)	8 (4)	12 (8)	
	Private Practice	178 (61)	174 (84)	18 (12)	
Number of babies treated every month	≤ 1	19 (6)	93 (45)	0 (0)	<0.01
	2-5	133 (46)	71 (35)	10 (6)	
	6-10	46 (16)	25 (12)	12 (8)	
	≥ 10	93 (32)	17 (8)	132 (86)	

Data are presented as numbers and (percentages).

* p values are the results of Pearson's Chi-Square tests between the groups of respondents for the categories of the demographic variables.

The majority of the midwives (90%) and GPs (95%) discharged the infants less than 48 hours after birth, while approximately two-thirds of the pediatricians (64%) discharged infants more than 48 hours after birth ($P < 0.05$). Twenty-nine percent of the midwives and 31% of the GPs indicated that the first follow-up visit was only after 72 hours, while infants were discharged rather soon after birth. Fifty-three percent of the respondents who had indicated that they discharged infants within 24 hours after birth scheduled the first follow-up visit after more than 48 hours, while 22% did so after more than 72 hours (Table 3).

Table 2. Result of the Survey

		Midwives N=291	GPs N=206	Pediatricians N=154	* p value
Early Recognition Jaundice	To palms and soles	44 (15)	102 (49)	77 (50)	
	Before 24 hours of age	112 (39)	39 (19)	60 (39)	
	And pale-colored feces	52(18)	24 (12)	6 (4)	
	Between 24 hrs to 14d	82 (28)	22 (11)	3 (2)	<0.01
	And bilirubin >10mg/dl	1 (0)	19 (9)	8 (5)	
Predischarge Bilirubin Measurement	Yes, mostly	48 (17)	53 (26)	12 (8)	
	Yes, if jaundice present	147 (50)	112 (54)	100 (65)	<0.01
	No	96 (33)	41 (20)	42 (27)	
Specific Guideline Use	IHM guideline	156 (54)	55 (27)	10 (7)	
	WHO guideline	41 (14)	94 (46)	7 (4)	
	AAP guideline	3 (1)	7 (3)	129 (84)	
	NICE guideline	0 (0)	2 (1)	3 (2)	
	No guideline	84 (29)	48 (23)	0	
	Other	7 (2)	0 (0)	5 (3)	<0.01
Guideline- Access	Yes	205 (71)	142 (69)	80 (52)	<0.01
	Not easy	85 (30)	64 (31)	74 (48)	
Problems in Management	Education	112 (38)	22 (11)	49 (32)	
	Diagnostics	15 (5)	44 (21)	32 (21)	
	Therapy	113 (39)	97 (47)	38 (24)	<0.01
	Facilities	51 (18)	43 (21)	35 (23)	
Case Scenario	Discharge and follow up	18 (6)	19 (9)	7 (4)	
	Lab tests bilirubin+ BG	128 (44)	117 (57)	83 (54)	
	Cancel discharge and start phototherapy	25 (9)	21 (10)	62 (40)	<0.01
	Refer to pediatrician	120 (41)	49 (24)	2 (1)	
Discharge (LOS)	≤ 24 hours	163 (56)	85 (41)	11 (7)	
	25-48 hours	99 (34)	111 (54)	45 (29)	<0.01
	> 48 hours	29 (10)	10 (5)	98 (64)	

		Midwives	GPs	Pediatricians	* <i>p</i> value
		N=291	N=206	N=154	
First Follow-up	≤ 24 hours	14 (5)	10 (5)	0 (0)	
	25-48 hours	107 (36)	49 (24)	9 (6)	
	49-72 hours	87 (30)	83 (40)	66 (43)	
	>72 hours	83 (29)	64 (31)	79 (51)	<0.01

Data are numbers and (percentages).

* *p* values are the results of Pearson's Chi-Square tests between the three types of health professionals in all categories of the variables. IHM is Indonesian Health Ministry. WHO is World Health Organization. AAP is American Academy of Pediatrics. NICE is National Institute for Health and Care Excellence. BG is blood group, rhesus and coombs testing. LOS is Length of Stay.

Table 3. Timing of First Follow Up Visit Related to Discharge (LOS)

First follow up	Discharge (LOS)			<i>p</i> value
	≤ 24 hours N=259	25-48 hours N=255	> 48 hours N=137	
≤ 24 hours	17 (7)	7 (3)	0 (0)	<0.01
25-48 hours	105 (40)	43 (17)	17 (12)	<0.01
49-72 hours	81 (31)	106 (41)	49 (36)	<0.01
>72 hours	56 (22)	99 (39)	71 (52)	<0.01

Data are numbers and (percentages).

*The *p* value is the result of the Pearson's Chi-Square test between the timing of discharge and the timing of the first follow up. LOS is Length of Stay.

Discussion

In this observational study, using questionnaires, we found that 29% of midwives and 23% of GPs in Indonesia were not aware of guidelines to diagnose and treat hyperbilirubinemia in newborn infants. Moreover, almost half of the midwives and 30% of GPs did not recognize risk factors for clinically relevant hyperbilirubinemia. Finally, almost 60% of midwives and more than 70% of GP's scheduled a FU visit more than 48 hours after early discharge from the hospital, while it is recommended in the guidelines

to see infants at least within 48 hours. These factors might contribute to the higher incidence of severe hyperbilirubinemia found in Indonesia compared to high-income countries.

Number of studies found that severe hyperbilirubinemia is more frequent in low and middle-income countries (4,5,11). This might be caused by either a limited availability of phototherapy, or late detection of hyperbilirubinemia. In Indonesia, phototherapy is available in most parts of the country, although it is not sure that the intensity of phototherapy is always sufficient. Identification of hyperbilirubinemia is generally done by the clinical evaluation of the infants, for instance using the Kramer score (12). Maisels et al reported that this score can help to identify infants with increased bilirubin levels, but it was not helpful to estimate the level of bilirubin (13). A measurement of bilirubin, either transcutaneous or in blood is necessary to distinguish those infants that need treatment. In the immediate first days after birth, daily visits of healthcare workers are needed to detect those infants at risk of severe hyperbilirubinemia that need a measurement of the bilirubin level.

Previous studies in high income countries also found that guidelines to prevent, diagnose and treat hyperbilirubinemia were not always followed (14-17). Tartaglia et al (15) used a compliance score to measure the use of the AAP guideline in the Children's Hospital in Columbus, USA. The compliance score increased from 60% before an intervention to 90% thereafter. The campaign aimed at increasing the awareness of the guidelines. Atkinson et al (14) found that pediatricians only provided phototherapy to 54% of infants in whom it was recommended according to the AAP guidelines. Darling et al (16) investigated the implementation of new guidelines made by the Canadian Pediatric Society in 100 hospitals in Canada. Seventy-nine of these hospitals indicated to have implemented these guidelines. However, only 70% of these hospitals had implemented measuring the bilirubin level before discharge, although this is recommended in the guidelines. The implementation of guidelines might help to reduce the incidence of severe hyperbilirubinemia was shown by Sgro et al (17). They found that, after the implementation of the Canadian guidelines, the incidence of severe hyperbilirubinemia decreased from 1 in 2480 to 1 in 8352 live born infants.

There are a number of reasons why guidelines might either not be implemented or not followed. Cabana et al (19) identified seven types of barriers for physicians to adhere to guidelines: lack of awareness, lack of familiarity, lack of agreement, lack of self-efficacy, lack of outcome

expectancy, inertia of previous practice and external barriers. Most of these barriers were applicable to the situation in Indonesia. We found that 29% of midwives and 23% of GPs were not aware of guidelines. This is an important problem, because these health care workers take care of the majority of 11 million per year newborn infants in Indonesia. Lack of agreement, of self-efficacy and lack of outcome expectations might well exist in midwives and GPs. Midwives were inclined to follow the natural course after birth and not to intervene by referring the infant for bilirubin measurement. They highly promote the use of exclusive breastfeeding, without supplementation of formula. At the same time, breastfeeding is an important risk factor for the development of hyperbilirubinemia, particularly if nursing is not going well. Midwives might not be fully aware of the risks of severe hyperbilirubinemia as they do not follow-up the infants for a longer period of time, and the total number of infants cared for is limited. Insufficient training might also play a role. Some of these factors might also apply to GPs. One third of pediatricians indicated not to measure the bilirubin level before discharge, while it is indicated in the AAP guidelines and repeated in a recent review (3). It might be due to either a lack of agreement or inertia of previous practice. It is unlikely related to external barriers. Pediatricians seem to rely on their clinical judgement, while it was known that clinical evaluation can not reliably distinguish between bilirubin levels that need treatment versus non-treatment (3,10).

There are a few well-known risk factors to develop severe hyperbilirubinemia in late preterm and term infants: gestational age less than 38 weeks, exclusive breastfeeding, jaundice in the first 24 hours, previous sibling with jaundice, cephalohematoma or significant bruising and hemolytic diseases (3,10,11). Being born to an Asian mother is also found to be a risk factor. Lack of knowledge of these risk factors by a high percentage of midwives, as shown in this study, also could be related to the high incidence of severe hyperbilirubinemia in Indonesia. This factor was of special interest when newborn infants were discharged home early, within 48 hours after birth. A home visit by an experienced health professional within 24 hours was recommended in case of risk factors (18).

Our study has a number of limitations. First, we used non-validated questionnaires developed by ourselves inspired by Canadian Pediatric Society (CPS) (20). However, other validated questionnaires were not available, and we first evaluated and confirmed whether the questions were clear and could be answered consistently. Secondly, we interviewed

only health professionals in few areas of Indonesia, so we are not sure the results are applicable for the whole of Indonesia. We received the questionnaires from 2% of all midwives and GPs in our area and almost 50% of the pediatricians. We doubt however if a larger area of larger group of participants would have changed our results. Third, we did not evaluate if the health professionals did in practice what they indicated in the questionnaires. We did not check medical records, because this is impossible with this group of participants.

Conclusion

The knowledge of and adherence to guidelines for the prevention and treatment of hyperbilirubinemia is rather low in midwives and GPs in Indonesia and need to be improved. This might be an important factor in causing the high incidence of severe hyperbilirubinemia in Indonesia.

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