

## The Prevalence of Intraventricular Hemorrhage in Preterm Neonates at Bent Alhuda Teaching Hospital, Nassiriyacity. Iraq

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### Abstract

#### Objective:-

A cross sectional study prospective study in Bint Alhuda teaching hospital extended from 1<sup>st</sup> of Oct 2017.-1<sup>st</sup> of Feb. 2018

the study was undertaken with the aims of determining the prevalence and most frequent grade of IVH as well as associated risk factors in preterm neonates admitted to the NCU at bent alhuda teaching hospital, Nassiriyah, Thiqr province

#### Results:-

In this study the prevalence of IVH in preterm infant was found to be 11.7%, with mild IVH being the most frequent at 8.7%, while severe IVH accounted for 1%..

#### Conclusions:-

1. Brain Ultrasound for premature babies are crucial
2. IVH is common problem in nursery care unit which need close follow up
3. Asymptomatic premature babies should be clinically observed for any neurological deficit
4. Grade 1 & 2 IVH have good prognosis and can live without neurological sequel

**Key words:** Intraventricular hemorrhage, preterm baby, Risk factors

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### I. Introduction

Intraventricular hemorrhage (IVH) is bleeding into the ventricles of the brain. One characteristic of the immature brain is a weakness of the blood vessels next to the ventricles. The ventricles are cavities that store cerebrospinal fluid (CSF) which nourishes the brain. Of particular concern is a collection of tiny and fragile blood vessels in the germinal matrix, which is the area of brain adjacent to the floor of the ventricles. This is a part of the brain that is active during fetal development but that disappears at about the 35<sup>th</sup> week of pregnancy. These blood vessels are thin and vulnerable to fluctuations in blood flow through them, which can cause them to rupture and bleed<sup>1</sup> The younger and smaller the baby, the higher the risk these blood vessels may be ruptured, usually in the first few days of life. A rupture causes blood to flow into a ventricle or ventricles of the brain. Pathogenesis of IVH is multifactorial and is primarily ascribed to a) inherent fragility of the germinal matrix vasculature, b) disturbance in the cerebral blood flow (CBF) because premature babies have passive pressure cerebral circulation so any rise or fall in systemic blood pressure lead to increase cerebral circulation and subsequent rupture of germinal blood vessels and c) platelet and coagulation disorders<sup>2</sup>. A number of risk factors including vaginal delivery, low Apgar score, severe respiratory distress syndrome, pneumothorax, hypoxia, hypercapnia, seizures, patent ductus arteriosus, thrombocytopenia, infection, and others predispose to the development of IVH. These risk factors appear to induce IVH primarily by disturbing the cerebral blood flow. However, thrombocytopenia contributes to IVH by causing hemostatic failure.<sup>3</sup>

#### Grading

The Papile classification:

Grade 1: subependymal germinal matrix haemorrhage.

Grade 2: IVH with no ventricular dilatation

Grade 3: IVH with ventricle distended by blood.

Grade 4: intraparenchymal haemorrhage.(3)

grade I is considered mild, grade 2 is moderate, 3&4 considered severe

Clinical presentation

Majority of patients with IVH have no clinical signs. Some infants with severe IVH develop on second or third day deterioration hypotension, apnea, pallor or cyanosis, convulsion or decrease muscle tone, acidosis, shock, falling in hematocrit.

IVH rarely manifest at birth about 50% of cases diagnosed at 1<sup>st</sup> day of life and 75% diagnosed at 3<sup>rd</sup> day.<sup>6</sup> If the IVH is classified as grade I or II, the chance that there will be long-term damage is small because the blood remains contained within the ventricles and the additional fluid does not cause excessive pressure.<sup>4</sup>

In grade III IVH, the bleeding is substantial enough to cause a swelling or obstruction of the narrow channels feeding into and out of the ventricles. This may interfere with the normal replenishment and flushing of the CSF. The result can be hydrocephalus, which is a build up of CSF in the ventricles, which puts pressure on surrounding brain tissues. This can then result in injury to that area of brain under pressure. If the bleeding is more severe, blood that has flowed into and filled the ventricles will permanently block CSF flow and lead to hydrocephalus with enlargement of the head, excessive pressure within the skull, and the need for a surgical intervention to relieve the pressure. A small tube or catheter called a ventriculoperitoneal shunt (VP shunt) is inserted to drain off the spinal fluid<sup>1</sup>

A grade IV IVH results from congestion to the brain tissue around the ventricles when a large IVH has occurred. This results in bleeding into the brain tissue itself with destruction of that area of brain. Lasting brain damage is almost always the result, the severity of which is determined by the extent and location of the bleeding. Premature infants with moderate to severe IVH (grade 3–4) are at high risk of post-hemorrhagic hydrocephalus, cerebral palsy and mental retardation, while infants with mild IVH (grade 1–2) are at risk of developmental disabilities<sup>5</sup>

Mechanical ventilation, which is often needed immediately after the birth of a premature baby, can also lead to fluctuations in blood flow. This is particularly likely when the baby is breathing out of sync with the ventilator, which creates additional pressures within the lung and blood vessels in the brain. Much work has been done over the years in an attempt to reduce this particular risk factor and improve a baby's assisted breathing in general<sup>1</sup>

The bleeding of IVH occurs typically within the first 48 hours following birth, and it is very unlikely to occur again at a later date<sup>4</sup>

There are two main ways in which IVH can potentially cause damage. First, IVH may affect the flow of CSF in the ventricles and second, IVH may cause damage to brain tissue adjacent to the ventricles<sup>5</sup>. Once damage has occurred to brain tissue, it cannot be reversed. However, physical damage to brain tissue does not necessarily mean damage to brain function. The areas of the brain that are often affected by an IVH, those adjacent to the ventricles, are those responsible for motor functions. Commonly, problems with vision and hearing, and other higher cognitive functions are associated. The extent of any long-term effect will often depend on the severity of the bleeding: babies with severe IVH are likely to develop some kind of neurological disability. Cerebral palsy (CP), a condition that interferes with motor coordination, is frequent. There is however, a wide range of disability with CP: those with hemiplegia are affected on one side of body only and children with milder forms of spastic diplegia, affecting only the legs, are usually able to walk with minimal supports.

Luckily, many babies who have a mild IVH go on to develop normally or with only minimal disabilities associated with learning<sup>5</sup>

#### **Aim of the study:-**

Estimation of the prevalence of IVH among new born babies in Bent alhuda teaching hospital

### **II. Method**

We collected descriptive (cross-sectional) material for this study from 1st-Oct 2017 to 1st-Feb-2018. The study was undertaken at the neonatal care unit of Bent al-huda teaching hospital in Thi-qar province. One hundred three preterm neonates were included in the study (59 male, 44 females). The tool of study was questionnaire that include questions about age of baby and mother, mode of delivery, birth weight, any family history of IVH, if baby have any symptoms (lethargy, convulsion, excessive cry).. then all babies subjected to brain U/S for IVH and grading..

### **III. Data analysis**

Data was analyzed using SPSS version 23, The dependent variable is preterm infants that admitted to neonatal care of bent alhuda teaching hospital and investigated by cranial ultrasound. And all cases are classified according to gestational age, sex, birth weight, mode of delivery, maternal diseases and patient symptoms. Then we find the relationship between prevalence of IVH and gestational age, sex, birth weight, mode of delivery, maternal diseases and symptoms.

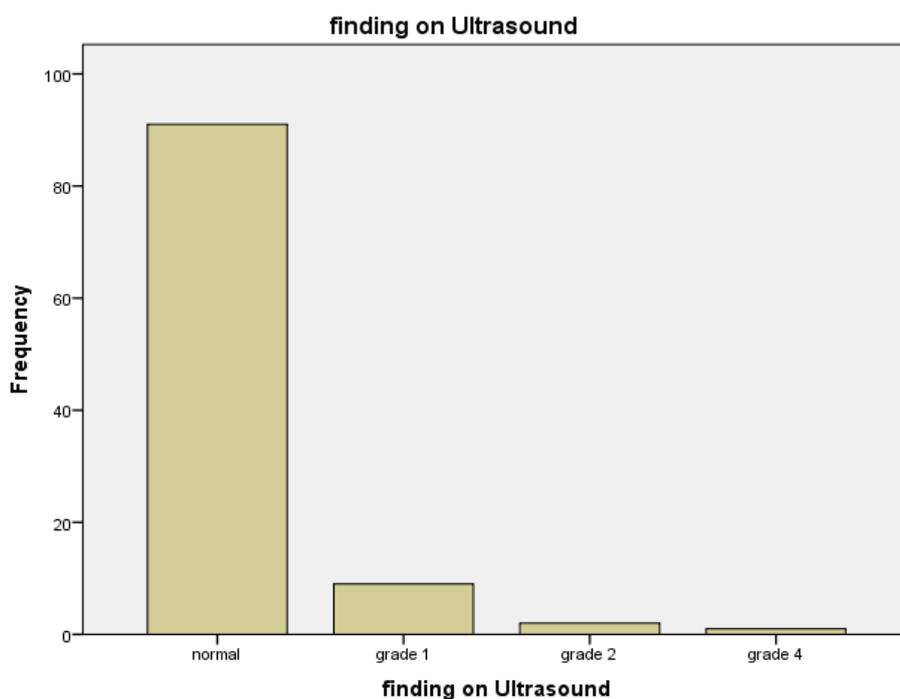
**IV. Results**

This present study includes 103 cases selected from neonatal care unit of Bent AL-Huda teaching hospital .cases selected as per inclusion criteria (preterm babies ). The total cases were distributed according to gestational age, sex , birth weight , mode of delivery ,maternal diseases and ultrasound findings .

A total of 103 cases , A 91 infants (88.3%) had normal ultrasound, 9 infants (8.7%) had IVH grade 1 , 2 infants (1.9%) had IVH grade 2 and only 1 infant (1.0%) had grade 4 as showing in table (1)

**Table 1 :** distribution of cases according to finding on Ultrasound

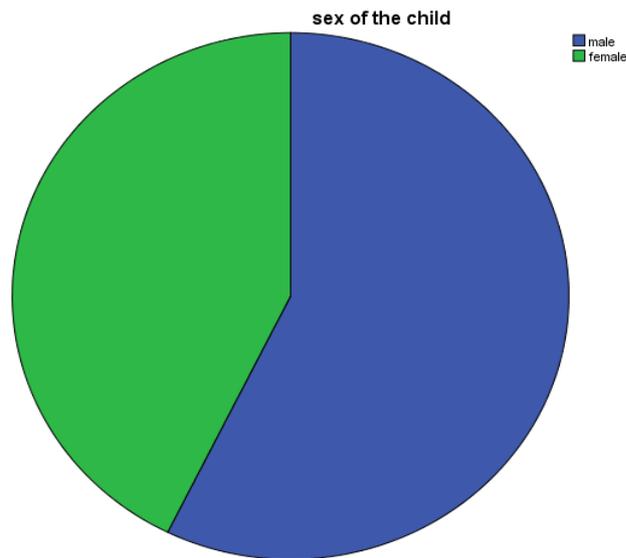
U/S	Frequency	Percent	Valid Percent	Cumulative Percent
Valid normal	91	88.3	88.3	88.3
grade 1	9	8.7	8.7	97.1
grade 2	2	1.9	1.9	99.0
grade 4	1	1.0	1.0	100.0
Total	103	100.0	100.0	



Out of 103 infants 59 cases (57.3%) are male while 44 of cases (42.7%) are female gender as showing in table (2)

**Table 2 :** distribution of cases according to sex of the child

Sex	Frequency	Percent	Valid Percent	Cumulative Percent
Valid male	59	57.3	57.3	57.3
female	44	42.7	42.7	100.0
Total	103	100.0	100.0	



Out of 103 infants 3 infants (2.9%) are extremely preterm<sup>\*</sup>, 19 infants (18.4%) are very preterm<sup>\*\*</sup> and 81 (78.7%) are mild preterm babies<sup>\*\*\*</sup> according to table (3)

**Table 3:** distribution of cases according to gestational age

G.A(wk)	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 25.00	1	1.0	1.0	1.0
28.00	2	1.9	1.9	2.9
29.00	1	1.0	1.0	3.9
30.00	6	5.8	5.8	9.7
31.00	6	5.8	5.8	15.5
32.00	6	5.8	5.8	21.4
33.00	14	13.6	13.6	35.0
34.00	23	22.3	22.3	57.3
35.00	24	23.3	23.3	80.6
36.00	20	19.4	19.4	100.0
Total	103	100.0	100.0	

\*Extremely preterm = 28 weeks or less

\*\* very preterm = 28 -32 weeks

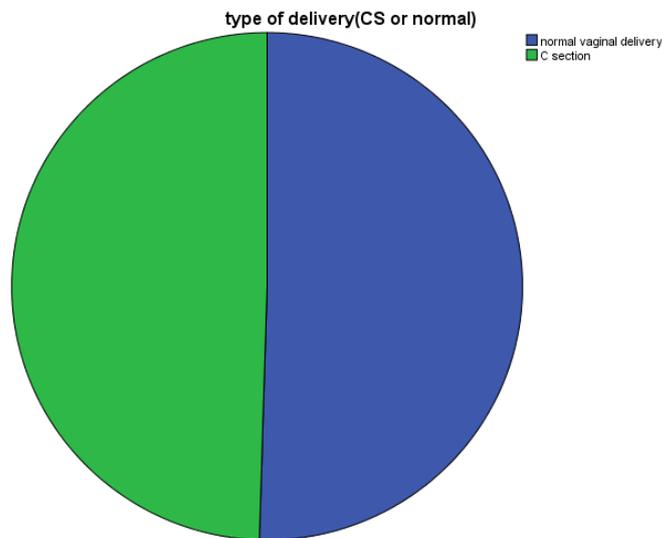
\*\*\* mild preterm = 32 or more .....<sup>\*7</sup>



In present study 52 infants (50.5%) delivered vaginally while 51 infants (49.5%) delivered by cesarean section as present in table (4)

**Table 4 :** distribution of cases according to type of delivery(CS or normal)

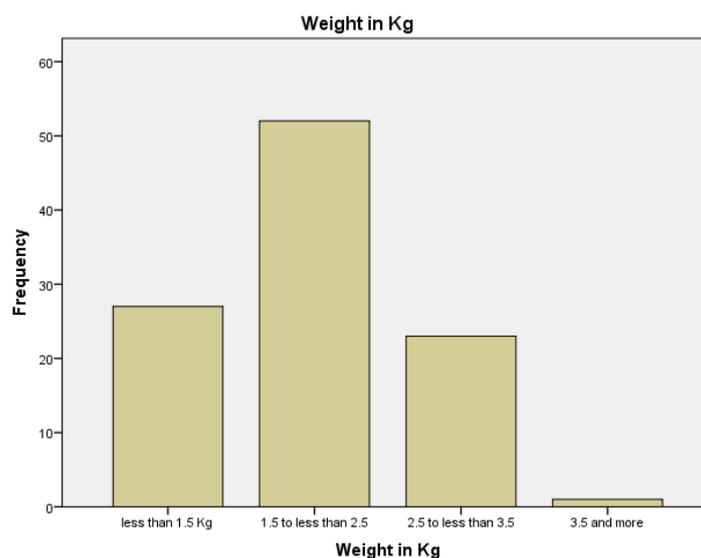
Type of delivery	Frequency	Percent	Valid Percent	Cumulative Percent
Valid vaginal delivery	52	50.5	50.5	50.5
C section	51	49.5	49.5	100.0
Total	103	100.0	100.0	



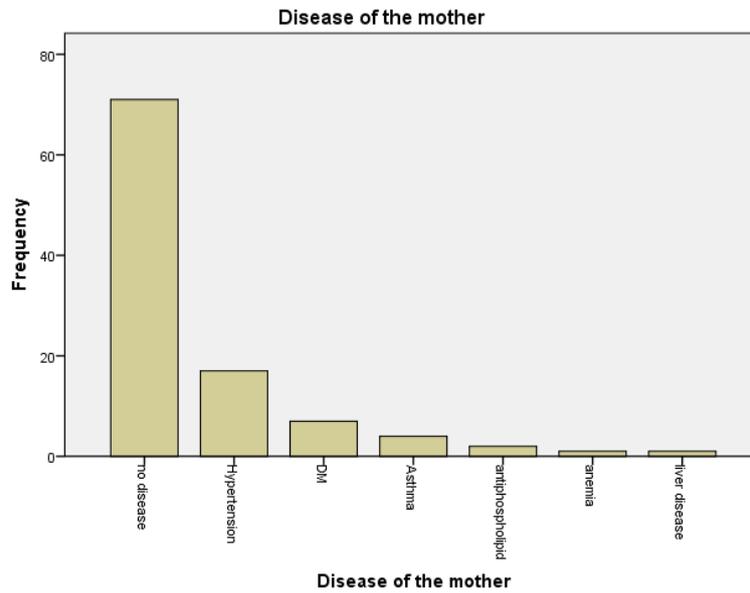
In present study out of 103 cases , 27 infants (26.2%) had a weight less than 1.5 kg , 52 infants (50.5%) had a body weight ( 1.5 – 2.5 kg ) , 23 infants (22.3%) had a body weight(2.5 -3.5 kg ) and only 1 infant (1.0%) had body weight more than 3.5 kg according to table (5)

**Table 5 :** distribution of cases according to birth Weight in Kg

Birth weight (kg)	Frequency	Percent	Valid Percent	Cumulative Percent
Valid less than 1.5 Kg	27	26.2	26.2	26.2
1.5 to less than 2.5	52	50.5	50.5	76.7
2.5 to less than 3.5	23	22.3	22.3	99.0
3.5 and more	1	1.0	1.0	100.0
Total	103	100.0	100.0	

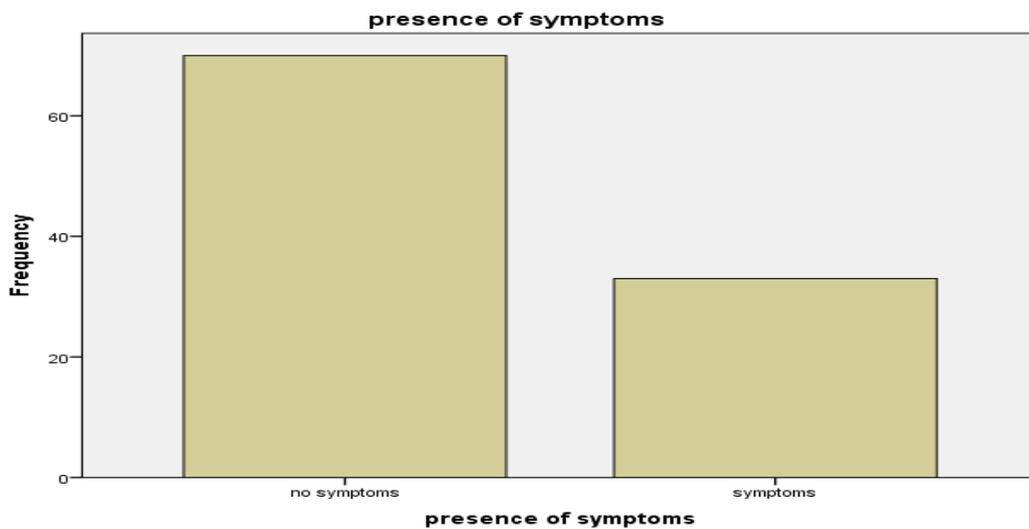


Maternal disease		Frequency	Percent
Valid	no disease	71	68.9
	Hypertension	17	16.5
	DM	7	6.8
	Asthma	4	3.9
	antiphospholipid	2	1.9
	anemia	1	1.0
	liver disease	1	1.0
	Total	103	100.0



Out of 103 cases ,70 infants (68%) had no symptoms and 33 infants (32)% had symptoms according to table (7)

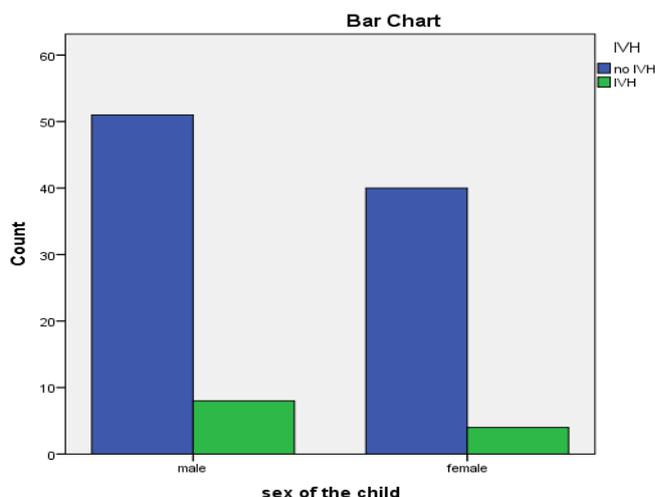
		Frequency	Percent
Valid	no symptoms	70	68.0
	symptoms	33	32.0
	Total	103	100.0



During the ultrasound investigation of brain we find 12 cases had IVH ; 8 cases are male gender and 4 cases are female gender as present in table (8)

**Table 8 :** sex of the child \* IVH Crosstabulation

sex of the child		IVH		Total
		no IVH	IVH	
male		51	8	59
female		40	4	44
Total		91	12	103



From 52 infants delivered vaginally 46 infants had no IVH and 6 had IVH and 51 infants delivered by cesarean section 6 of them had IVH and 41 infant had no IVH According to table (9)

**Table 9 :** type of delivery(CS or normal) \* IVH Crosstabulation  
Count

type of delivery		IVH		Total
		no IVH	IVH	
normal vaginal delivery		46	6	52
C section		45	6	51
Total		91	12	103

A total of 12 IVH patients , 4 of them had a body weight less than 1.5 kg , 5 of them had a body weight (1.5-2.5kg) , 3 of them had a body weight ( 2.5 – 3.5) kg and no infant had IVH his body weight more than 3.5 kg as table 10

**Table 10 :** Weight in Kg \* IVH Crosstabulation  
Count

Weight in Kg		IVH		Total
		no IVH	IVH	
less than 1.5 Kg		23	4	27
1.5 to less than 2.5		47	5	52
2.5 to less than 3.5		20	3	23
3.5 and more		1	0	1
Total		91	12	103

A total of 12 IVH infants 8 of them their mothers had no disease ; 2 of them their mothers are diabetic , 1 of them had antiphospholipid syndrome and 1 of them had chronic liver disease as present in table 11

**Table 11 :** Disease of the mother \* IVH Crosstabulation

Maternal diseases		IVH		Total
		no IVH	IVH	
	no disease	63	8	71
	Hypertension	17	0	17
	DM	5	2	7
	Asthma	4	0	4
	antiphospholipid	1	1	2
	anemia	1	0	1
	liver disease	0	1	1
Total		91	12	103

A total of 12 IVH patients all of them had a symptoms of IVH and no of them is asymptomatic as showing in table 12

**Table 12 :** presence of symptoms \* IVH Crosstabulation

presence of symptoms		IVH		Total
		no IVH	IVH	
	no symptoms	70	0	70
	symptoms	21	12	33
Total		91	12	103

## V. Discussion

This study investigated the prevalence of IVH in neonate admitted to the neonatal care unit at Bent Alhuda teaching hospital. It was imperative to have information on prevalence of IVH which condition has potential to seriously compromise the quality of life of affected surviving neonates. The overall prevalence was found to be 11.7%, with mild IVH being the most frequent at 8.7%, while severe IVH accounted for 1%. Similar studies in Iran, (Sajjadian N)<sup>8</sup>, with fewer subject numbers have shown much higher rate in prevalence of IVH and higher frequency of severe IVH.

Studies in South Africa (Sandler D.L)<sup>9</sup>, have shown much lower rates in frequency of severe IVH but higher prevalence of IVH, similar studies in Zambia (Mulindwa M.J)<sup>10</sup>, with large sample size, shown much higher rate in prevalence of IVH. Analysis of some of the associated risk factors showed statistically difference in birth weight between neonate with and without IVH. Gender with males being more at risk than females and this similar to study in United States (Mohamed MA)<sup>11</sup>. Mode of delivery show equal in relation to IVH while in Zambia C/S more higher than normal vaginal delivery. No relation between maternal disease and IVH. All of babies are symptomatic.

## VI. Conclusion

1. Brain Ultrasound for premature babies are crucial
2. IVH is common problem in nursery care unit which need close follow up
3. Asymptomatic premature babies should be clinically observed for any neurological deficit
4. Grade 1 & 2 IVH have good prognosis and can live without neurological sequel

## VII. Recommendations

- 1-encourage hospital delivery for all premature babies
- 2-optimal resuscitation for baby in neonatal care unit
- 3-all preterm babies should undergo brain U/S for IVH in Ncu
- 4-good antenatal care to prevent premature delivery

### Abbreviations

IVH :intra ventricular hemorrhage  
 Ncu :nursery care unit  
 u/s ultra sound

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