

CURRENT STATUS OF PEDIATRIC INTENSIVE CARE IN ASIA AND KOREA

SCENARIO IN KOREA

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Contents

- Status of PCC in S. Korea
 - ▣ Past
 - ▣ Current
 - Based on questionnaire survey
- **Future scenario** of PCC in S. Korea



PAST

The Milestones of PCC in S. Korea

Year 1985

- The 1st PICU in South Korea
- Seoul National University Children's Hospital (20 beds)

Year 1994

- Asan Medical Center opened a PICU (11 beds)
- Samsung Medical Center opened a PICU (10 beds)

Year 2000

- The 1st full-time pediatric intensivist in South Korea
- Prof. June Dong Park (now the president of KPICS)

The Milestones of PCC in S. Korea

May 2011

Korean Pediatric Intensive Care Society (KPICS) was founded



July 2011

The 1st medical conferences of KPICS (continuing bimonthly)



April 2015

The 1st seminar for development of KPICS (continuing bimonthly)



Current

Current Status of KPICS

- Korean Pediatric Intensive Care Society
 - ▣ About 10 core members (physicians)
 - ▣ Bimonthly
 - Medical conferences
 - A special lecture
 - 3 case reports and discussions
 - Seminars for development of KPICS
 - ▣ Nonofficial and informal group
 - No regulations
 - No membership certifications and fees
 - Not registered with Korean Academy of Medical Sciences

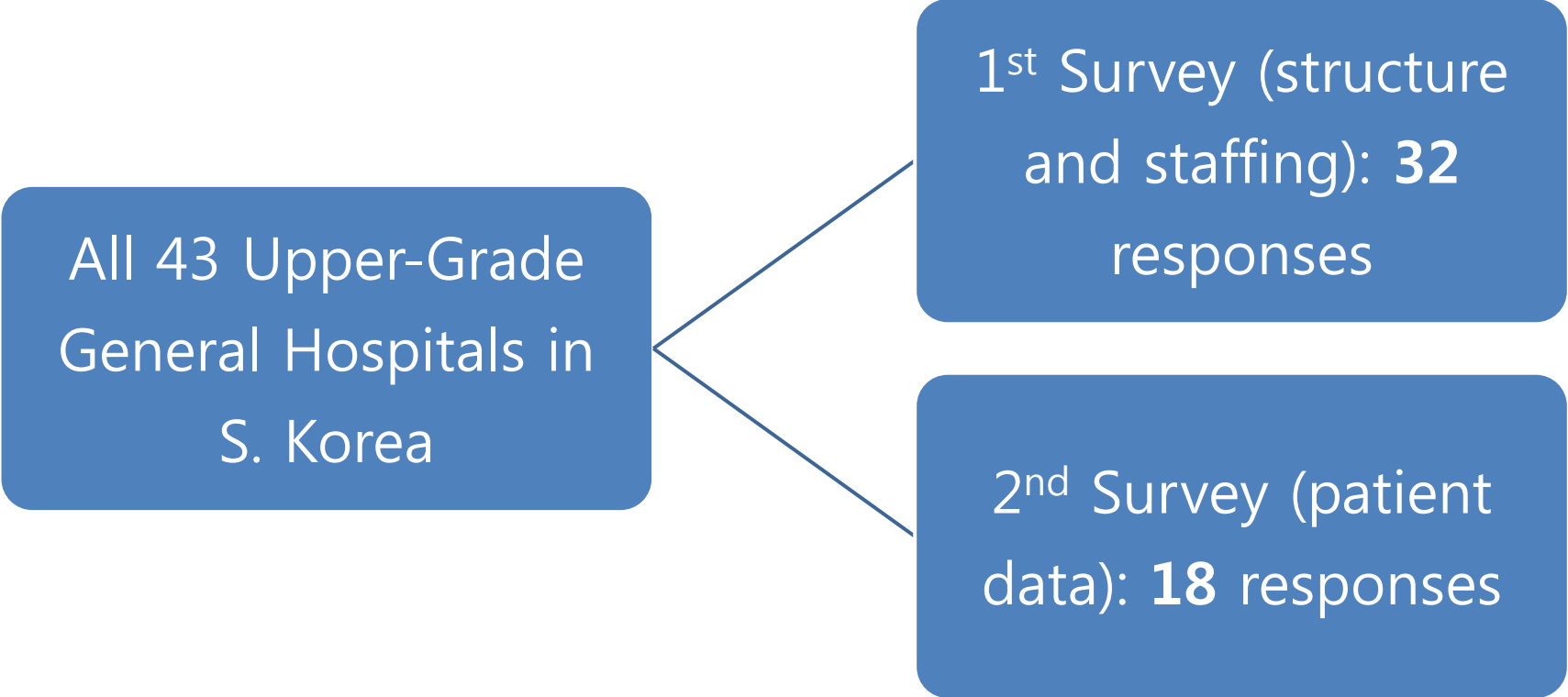


Questionnaire Survey on Current Status of Pediatric Critical Care in South Korea

From May to August in 2015

Questionnaire Survey

All 43 Upper-Grade
General Hospitals in
S. Korea



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graph LR; A[All 43 Upper-Grade General Hospitals in S. Korea] --> B[1st Survey (structure and staffing): 32 responses]; A --> C[2nd Survey (patient data): 18 responses];
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1st Survey (structure
and staffing): **32**
responses

2nd Survey (patient
data): **18** responses

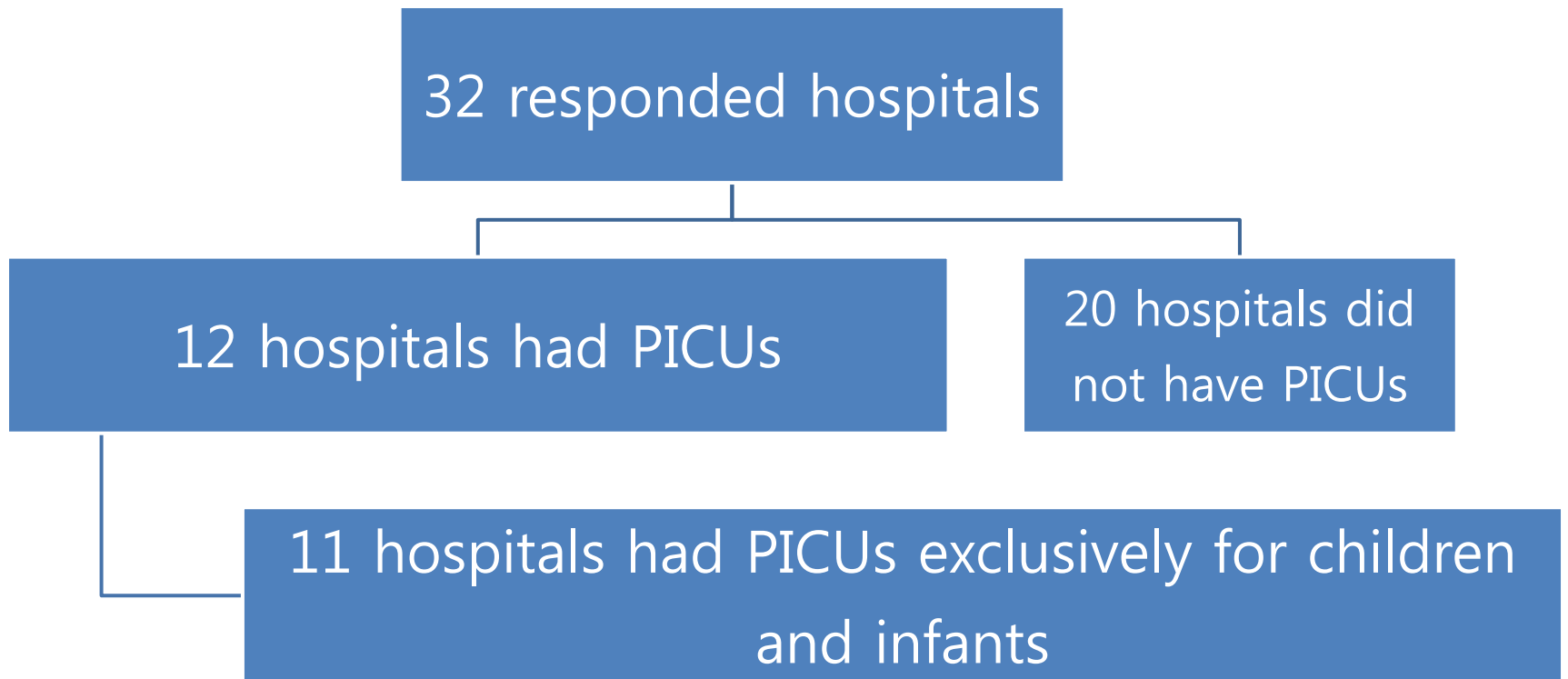
Questionnaire Survey

- 32 Hospitals responded to the 1st survey

	Mean ± SD (range)
No. of total beds	1,069.47±456.41 (550 – 2,700)
No. of beds for pediatrics	116.53±89.01 (22 – 403)
% of beds for pediatrics	10.48±(3.14 - 30.4)

Questionnaire Survey

1st survey



Questionnaire Survey

- The number of ICU beds

	Mean \pm SD (range)
PICU (N=12 hospitals)	9.42 \pm 9.3 (2 - 30)
NICU (N=31 hospitals)	26.13 \pm 13.41 (4 - 58)
Adult ICU (N=32 hospitals)	59.5 \pm 27.88 (13-137)

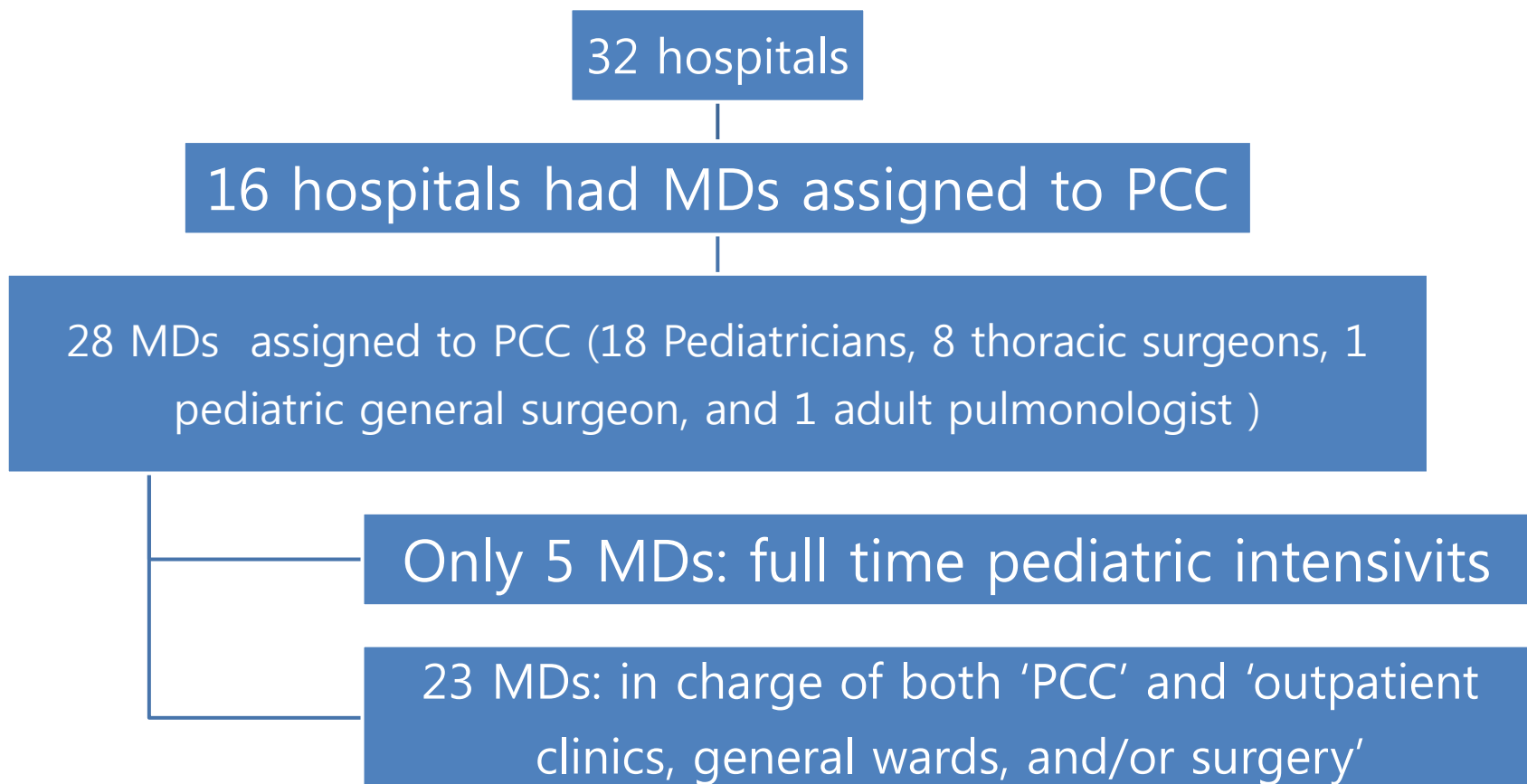
Questionnaire Survey

- The structure of PICU
 - ▣ 5 types of PICU across 12 hospitals

Structure	No. of hospitals
Medical PICU	4
Surgical PICU	1
Cardiac PICU	3
Medical-surgical PICU	4
'Pediatric & adult' ICU	1

Questionnaire Survey

- Attending MDs assigned to PCC



Questionnaire Survey

□ Subspecialties of 18 pediatricians

Subspecialties	No. of MDs
Pediatric intensive care	3
Pediatric intensive care and neonatology	2
Pediatric intensive care, pediatric allergology, and pediatric pulmonology	4
Pediatric intensive care and pediatric cardiology	2
Pediatric intensive care and pediatric hemato-oncology	1
Neonatology	2
Pediatric allergology and pediatric pulmonology	1
Pediatric cardiology	1
Pediatric neurology	1
Pediatric hemato-oncology	1

Questionnaire Survey

- Difficulties in managing pediatric critical care, mainly because of
 - ▣ No PICU
 - ▣ No MD who was exclusively in charge of PCC
 - ▣ Low medical prices for PCC

Questionnaire Survey

**2nd
survey**

Total 43 Upper-Grade General
Hospitals

No responses:
25 hospitals

Full responses: 17 hospitals

Partial response: 1 hospital

Questionnaire Survey

18 responded hospitals	Number	
	Total	Mean \pm SD (range)
Nurses who exclusively assigned to children	239/around 102 pediatric beds	13.3 \pm 18.4 (0 - 52)
Mechanical ventilator applicable to infants and children	200	11.1 \pm 8.6 (0 - 27)
Noninvasive ventilator for infants and children	58	3.2 \pm 3.1 (0 - 10)

Questionnaire Survey

18 responded hospitals (around 102 beds)	Number	
	Total	Mean \pm SD (range)
New onset of pediatric critical care patients in recent one month	370	20.6 \pm 31.1 (0 - 109)
Pediatric patients on the survey day	102	5.7 \pm 7.2 (0 - 22) 0: 7 hospitals
Pediatric patients died in 24 hrs (based on survey day)	0	0

Questionnaire Survey

- Characteristics of PCC patients on survey day

17 responded hospital (No. of patients=97)

Gender

Male 64 (66.0%)

Female 33 (34.0%)

Age (years) 3.4 ± 5.6 (range: 0 – 25)

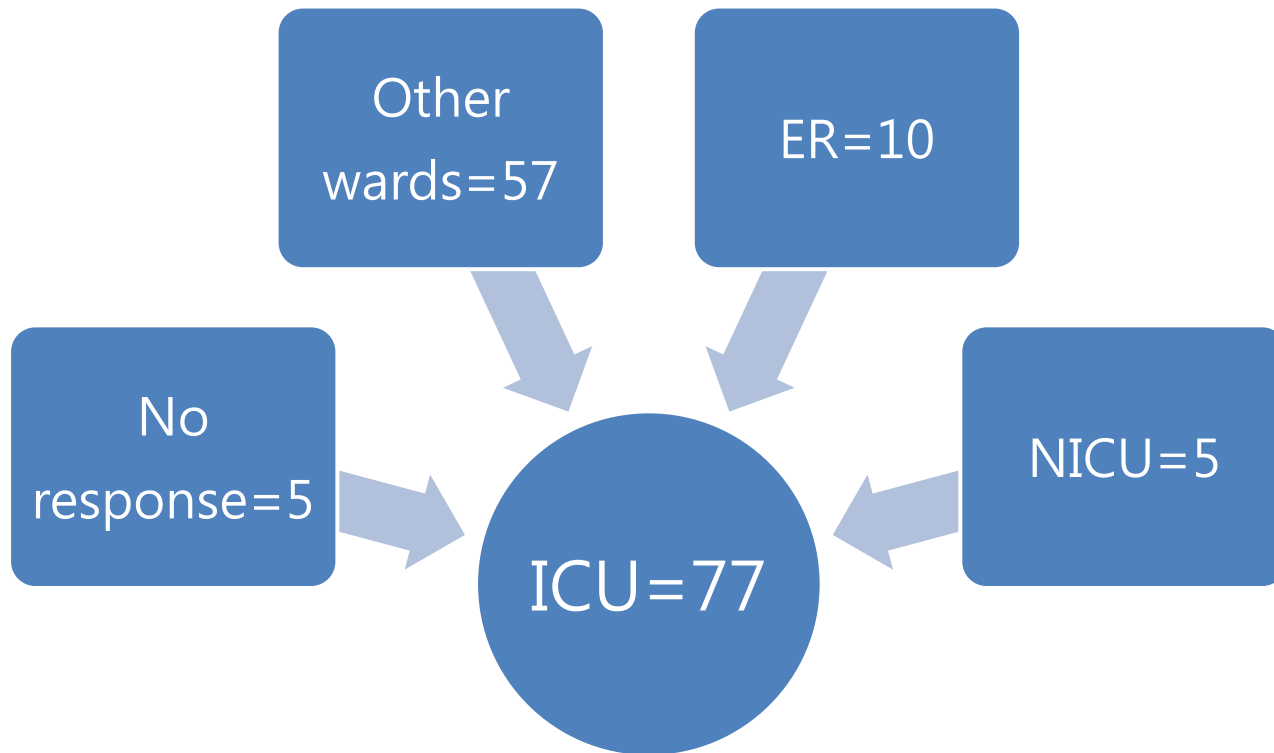
Hospital days (days) 81.7 ± 270.8 (range: 1-2,539)

ICU stay (days) 64 ± 265.9 (range: 1-2,539)

ICU stay/hospital days (%) 70.6%

Questionnaire Survey

- Intra-hospital transfer



Questionnaire Survey

- Transfer from other hospital (N=13)
 - 5: in the same city
 - Seoul -> Seoul: 3
 - Busan -> Busan: 2
 - 7: from other cities
 - 1: no response



Transfer from other cities

Questionnaire Survey

- Characteristics of PCC patients on survey day

17 responded hospital (No. of patients=97)

Assigned Dept.	No. of pt.
Pediatrics	57
Thoracic surgery	26
Critical care medicine	8
General surgery (including ped. GS)	4
Neurosurgery	1
Transplantation surgery	1

Questionnaire Survey

□ Categories of diagnosis

Categories	No. of diagnosis
Neurology	27
Cardiology	24
Pulmonology	20
GI	9
Infection	8
Neonatology	7
Congenital Anomaly	4
Hematology	4
Others	4
Nephrology	3
Critical Care	2
Metabolic Disease	2
General Pediatrics	1
Transplantation	1

Questionnaire Survey

- Common neurology diagnosis
 - ▣ Developmental Delay
 - ▣ Seizure/epilepsy/status epilepticus
 - ▣ HIE
 - ▣ IVH
 - ▣ Lennox-Gastaut Syndrome

Questionnaire Survey

- Common cardiology diagnosis
 - ▣ VSD
 - ▣ Coarctation of aorta
 - ▣ ASD
 - ▣ DORV
 - ▣ Heart Transplantation
 - ▣ PDA
 - ▣ Hypoplastic Left Heart Syndrome
 - ▣ MAPCA
 - ▣ Taussig Bing Anomaly
 - ▣ TGA

Questionnaire Survey

- Common pulmonology diagnosis
 - ▣ Aspiration Pneumonia
 - ▣ BPD
 - ▣ Bronchiolitis obliterans
 - ▣ Pleural effusion
 - ▣ Pneumonia
 - ▣ Tracheal stenosis
 - ▣ Vocal cord palsy

Questionnaire Survey

- Common GI diagnosis
 - ▣ Bowel perforation
 - ▣ Congenital diaphragmatic hernia
 - ▣ Hepatic failure
 - ▣ Hirschsprung's disease
 - ▣ Intestinal transplantation
 - ▣ Short bowel syndrome
 - ▣ Wilson disease
 - ▣ Congenital megacolon

Questionnaire Survey

- Common infection diagnosis
 - ▣ Chronic EBV Infection
 - ▣ Urosepsis
 - ▣ Sepsis/septic shock
 - ▣ Viral pneumonia

Questionnaire Survey

□ Characteristics of PCC patients on survey day

17 responded hospital (No. of patients=97)

PRISM III score on admission to ICU (N = 91) 9.4 ± 7.8 (range, 0 – 32)

On mechanical ventilator (N, %) 62/97 (63.9%)

On noninvasive ventilation (N, %) 3/97 (3.1%)

Mental status (N, %)

Alert 68 (70.1%)

Sedated 11 (11.3%)

Drowsy 1 (1%)

Stuporous 15 (15.5%)

Semicoma 1 (1%)

Coma 1 (1%)

Questionnaire Survey

- Characteristics of PCC patients on survey day

17 responded hospital (No. of patients=97)

Having central line (N, %)	85 (87.6%)
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Questionnaire Survey

□ Characteristics of PCC patients on survey day

17 responded hospital (No. of patients=97)

Sedation and paralysis (N, %)	34 (35.1%)
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1 medication (midazolam, fentanyl, and chloral hydrate)

2 medications

Fentanyl and 'midazolam or vecuronium'

Midazolam and phenobarbital

3 medications

Midazolam, fentanyl, and 'vecuronium or ketamine'

4 medications

Midazolam, Ketamine, Vecronium, Remifentanyl

5 medications

Dexmedetomidine, Midazolam, Ketamine, Fentanyl, Vecronium

Sedation assessment

GCS

COMFORT score

No assessment

Questionnaire Survey

- Characteristics of PCC patients on survey day

17 responded hospital (No. of patients=97)

Vasoactive agents (N, %)	38 (39.2%)
Organ failure (N, %)	38 (39.2%)
Terminal status	6 (6.2%)

Questionnaire Survey

□ Vasoactive agents

1 agent

Dobutamine, dopamine, milrinone, or norepinephrine **11/38 (28.9%)**

2 agents

11/38 (28.9%)

Dobutamine, Epinephrine 1/11 (9.1%)

Dobutamine, Milrinone 2/11 (18.2%)

Dobutamine, Norepinephrine 1/11 (9.1%)

Dopamine, Dobutamine 1/11 (9.1%)

Dopamine, Milrinone 5/11 (45.5%)

Dopamine, Norepinephrine 1/11 (9.1%)

Questionnaire Survey

□ Vasoactive agents

3 Agents

**9/38
(23.7%)**

Dobutamine, Milrinone, Epinephrine	2/9 (22.2%)
Dopamine, Dobutamine, Epinephrine	2/9 (22.2%)
Dopamine, Milrinone, Epinephrine	2/9 (22.2%)
Dopamine, Norepinephrine, Vaspressin	1/9 (11.1%)
Dopamine, Vasopressin, Epinephrine	1/9 (11.1%)
Milrinone, Nitroglycerin, Nitroprusside	1/9 (11.1%)

Questionnaire Survey

□ Vasoactive agents

4 agents

4/38 (10.5%)

Dopamine, Dobutamine, Epinephrine,
Milrinone

1/4 (25%)

Dopamine, Dobutamine, Epinephrine,
Norepinephrine

1/4 (25%)

Dopamine, Dobutamine, Epinephrine,
Vasopressin

1/4 (25%)

Dopamine, Milrinone, Nitroglycerin,
Nitroprusside

1/4 (25%)

Questionnaire Survey

□ Vasoactive agents

5 agents

3/38 (7.9%)

Dopamine, Dobutamine, Milrinone,
Nitroglycerin, Nitroprusside

1/3 (33.3%)

Dopamine, Epinephrine, Milrinone,
Nitroglycerin, Nitroprusside

1/3 (33.3%)

Dopamine, Dobutamine, Epinephrine,
Milrinone, Nitroglycerin, Nitroprusside

1/3 (33.3%)

Questionnaire Survey

□ Organ failure

1 organ

Brain

21/32 (65.6%)

1/21 (4.8%)

Heart

4/21 (19%)

Kidney

4/21 (19%)

Liver

2/21 (9.5%)

Lung

10/21 (47.6%)

2 organs

Heart and kidney

10/32 (31.3%)

Heart and lung

5/10 (50%)

Liver and lung

1/10 (10%)

Lung and kidney

1/10 (10%)

4 organs

Lung, kidney, liver, and pancreas

1/32 (3.1%)

1/1 (100%)

Questionnaire Survey

□ Terminal status

Terminal status (N, %)	6 (6.2%)
No response	1/6 (16.7%)
GvHD	1/6 (16.7%)
Refractory seizure	2/6 (33.3%)
Relapsed neuroblastoma	1/6 (16.7%)
Severe brain edema	1/6 (16.7%)

Questionnaire Survey

□ Nutritional supports

Nutritional support (from 97 pts)	N (%)
No	13 (13.4)
Enteral (oral and tube)	52 (53.6)
Parenteral	8 (8.2)
Enteral and parenteral	24 (24.7)

Questionnaire Survey

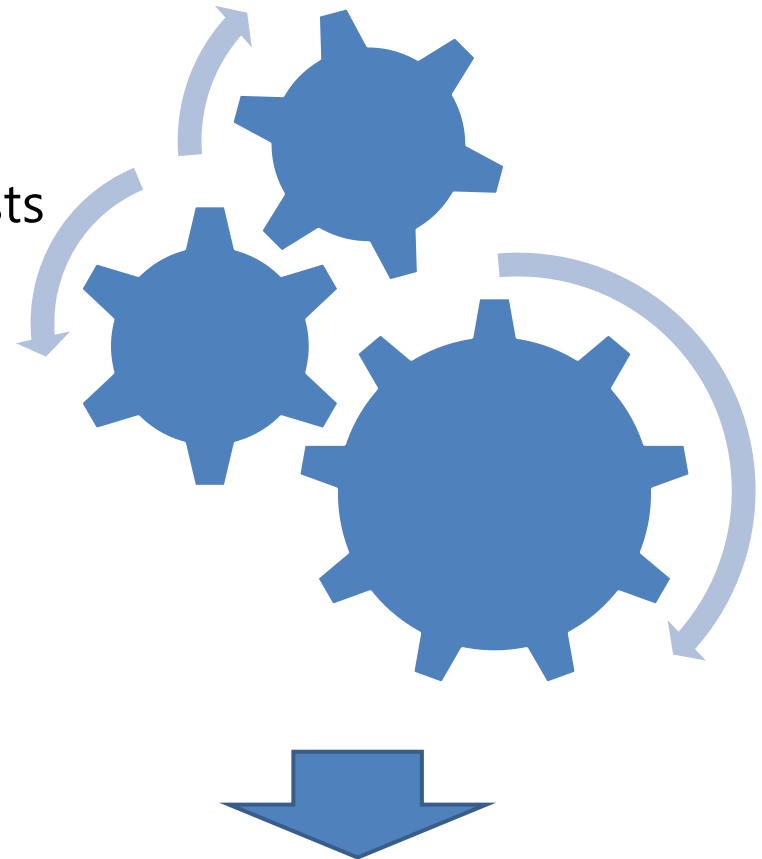
- 2/18 hospitals had sub-PICU
 - ▣ Intermediate form bet. PICU and general ward
- The existence of sub-PICU
 - ▣ 9/18 hospitals: necessary

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Scenario for the Future

Scenario for the future

- 'Official' society of PCC
 - ▣ Official journal
 - ▣ Annual meeting
 - ▣ Continuing medical education
 - ▣ Certification for pediatric intensivists
- International affair
 - ▣ WFPICCS
 - ▣ WFSICCM
- Governmental policy
 - ▣ Medical insurance price
 - ▣ The number and quality of PICUs



Development of PCC in South Korea and the World

Thank you!

34 Hospitals Responded to the Survey

- Gachon University Gil Medical Center
- The Catholic University of Korea, Seoul St. Mary's Hospital
- The Catholic University of Korea, Incheon St. Mary's Hospital
- Kangbuk Samsung Hospital
- Konkuk University Medical Center
- Kyungpook National University Children's Hospital
- Gyeongsang National University Hospital
- KyungHee University Medical Center
- Korea University Ansan Hospital
- Korea University Anam Hospital
- Dankook University Hospital
- Daegu Catholic University Medical Center
- Keimyung University Dongsan Medical Center
- Dong-A University Hospital
- Pusan National University Hospital
- Pusan National University Children's Hospital
- Seoul National University Bundang Hospital
- Samsung Medical Center
- Seoul National University Hospital
- Asan Medical Center
- Soonchunhyang University Cheonan Hospital
- Ajou University Hospital
- Ulsan University Hospital
- Severance Hospital
- Ewha Womans University Medical Center
- Inje University Busan Paik Hospital
- Chonnam National University Hospital
- Chonbuk National University Children's Hospital
- Chosun University Hospital
- Chung-Ang University Hospital
- Chungnam National University Hospital
- Hallym University Sacred Heart Hospital
- Hanyang University Medical Center
- Chonnam National University Hwasun Hospital

Thank you!

□ Korean Pediatric Intensive Care Society (KPICS)



June Dong Park

(**President** of KPICS, Seoul Nat. Univ. Children's Hospital)



Seong Jong Park

(Asan Medical Center)



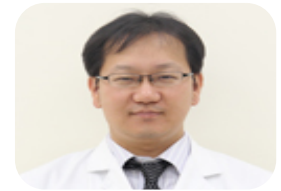
June Huh

(Samsung Medical Center)



Young Yoo

(Korea University Anam Hospital)



Byung Wook Eun

(Eulji General Hospital)



Jong-seo Yoon

(Planning director of KPICS, Seoul St. Mary's Hospital)



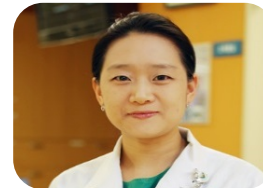
Nam Kyun Kim

(Severance Hospital)



Yoon Hee Kim

(Severance Hospital)



Won Kyoung Jhang

(Asan Medical Center)



Kyung Won Kim

(Severance Hospital)



Joongbum Cho

(Secretary General of KPICS, Samsung Medical Center)