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# Enhance quality care performance: Determination of the variables for establishing a common database in French paediatric critical care units

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## Abstract

Selected variables for the French Paediatric Intensive Care registry.

**Rationale, aims, and objectives:** Providing quality care requires follow-up in regard to clinical and economic activities. Over the past decade, medical databases and patient registries have expanded considerably, particularly in paediatric critical care medicine (eg, the Paediatric Intensive Care Audit Network (PICANet) in the UK, the Australian and New Zealand Paediatric Intensive Care (ANZPIC) Registry in Australia and New Zealand, and the Virtual Paediatric Intensive Care Unit Performance System (VPS) in the USA). Such a registry is not yet available in France. The aim of this study was to determine variables that ought to be included in a French paediatric critical care registry.

**Methods:** Variables, items, and subitems from 3 foreign registries and 2 French local databases were used. Items described each variable, and subitems described items. The Delphi method was used to evaluate and rate 65 variables, 90 items, and 17 subitems taking into account importance or relevance based on input from 28 French physicians affiliated with the French Paediatric Critical Care Group. Two ratings were used between January and May 2013.

**Results:** Fifteen files from 10 paediatric intensive care units were included. Out of 65 potential variables, 48 (74%) were considered to be indispensable, 16 (25%) were

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considered to be optional, and 1 (2%) was considered to be irrelevant. Out of 90 potential items, 62 (69%) were considered to be relevant, 23 (26%) were considered to be of little relevance, and 5 (6%) were considered to be irrelevant. Out of 17 potential subitems, 9 (53%) were considered to be relevant, 6 (35%) were considered to be of little relevance, and 2 (12%) were considered to be irrelevant.

**Conclusions:** The necessary variables that ought to be included in a French paediatric critical care registry were identified. The challenge now is to develop the French registry for paediatric intensive care units.

#### KEYWORDS

critical care, database, paediatrics

## 1 | INTRODUCTION

The requirements of research and yearly national monitoring of medico-economic activities have led to the development of national networks of critical care units.<sup>1-4</sup> The "Paediatric Intensive Care Audit Network" (PICANet, <http://www.picanet.org.uk>) in the UK has allowed for a clinical audit of the 35 paediatric critical care units since 2001. The Paediatric Study Group of the Australian and New Zealand Society established the "Australian and New Zealand Paediatric Intensive Care (ANZPIC)" network or registry in 1997 (<http://www.anzics.com.au/Pages/Paediatrics.aspx>).<sup>5</sup> In the United States, the Virtual Paediatric Intensive Care Unit Performance System (VPS) network (<https://portal.myvps.org/login>) was developed in 2003.<sup>6</sup> Whereas the size of these foreign databases is growing, such a network of the French paediatric intensive care units (PICUs) does not exist in France.<sup>7</sup> There has not been a single study to date that was aimed at consensual standardization of the variables used for data collection in PICUs. The existing databases were not built by a consensual medical expertise using the Delphi method.

The aim of this work was to determine the variables required for a common database for French PICUs to improve quality of care and to develop medico-economic assessment.

## 2 | MATERIALS AND METHODS

### 1. Reference databases

The inclusion criteria to select available databases on PubMed were searched for using the keywords "registry, database, paediatric intensive care, or PICU". The 3 general foreign databases (the PICANet, ANZPIC, and VPS) with publications were selected. The 2 French databases (the PICUs of Robert-Debré and of Lille) that use severity scoring systems were also selected. All of the data of these 5 databases were used. Exclusion criteria were specific database (for example, the National Emergency Airway Registry for Children NEAR4KIDS).

Variables were classified according to the Donabedian referential, using data of structure, process, and results. The candidate variables were classified into 7 categories: hospital, patient, medical data, outcome, follow-up at 30 days, nosocomial infections, procedures,

and diagnostics.<sup>8</sup> Each candidate variable was assigned items (characterizing the variables) and subitems. Items specifically described each variable, and subitems described each item.

Ratings from 1 to 4 were defined for the variables (ie, "indispensable", "optional", "useless", and "no rating"), for the items and the subitems ("relevant", "of little relevance", "not relevant", and "no rating"). The scores proposed by the 5 databases were the mortality scores (PRISM III and PIM3), the organ dysfunction scores (PELOD2), and the disability scores.<sup>9-12</sup>

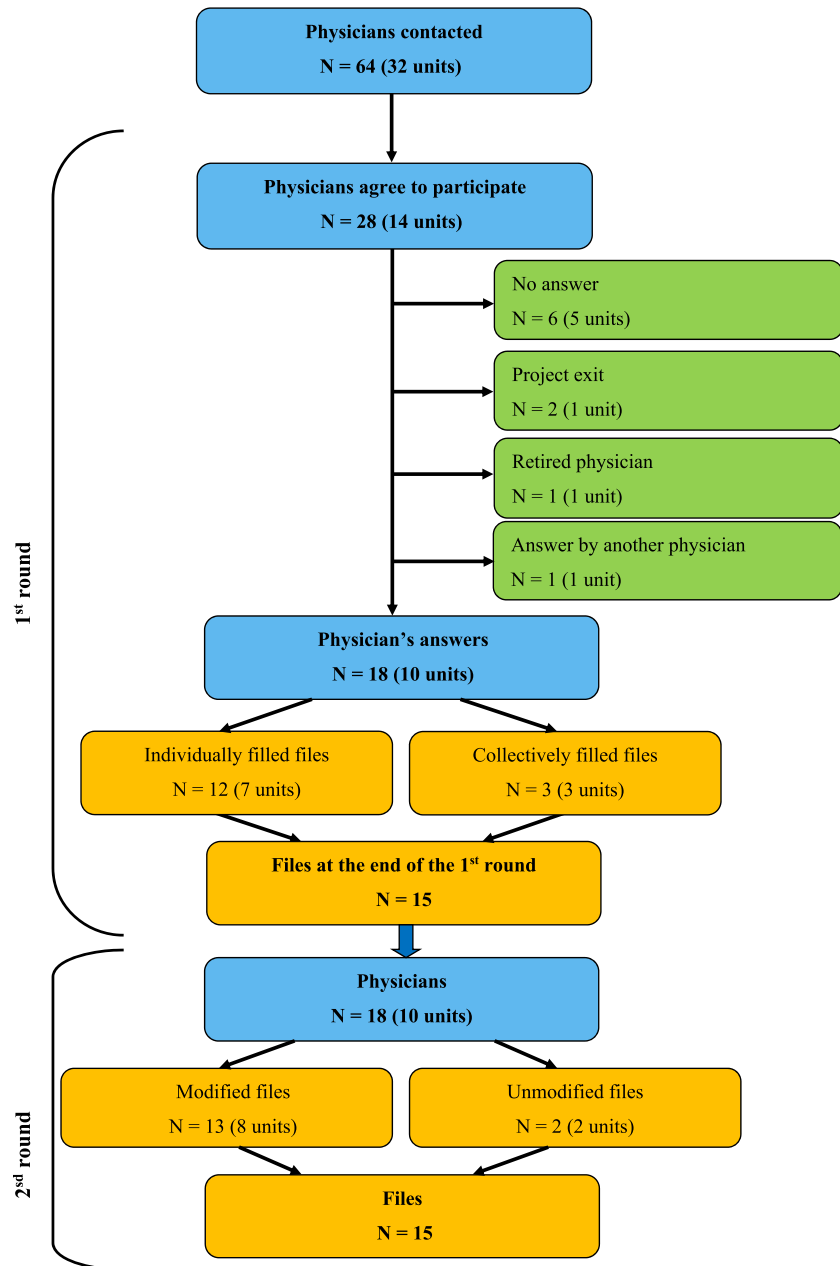
### 2. Delphi method

During the study period between January and May 2013, 2 physicians per centre (the manager and the comanager) of the 32 PICUs affiliated with the GFRUP (the French-Language Paediatric Emergency and Critical Care Group) were contacted by email or by phone to participate in the study.<sup>13</sup> The Delphi method was used for consensual selection,<sup>14</sup> using 2 rounds of voting. The Delphi method is a systematic way of determining expert consensus that is useful for answering questions that are not amenable to experimental and epidemiological methods. The Delphi technique is a structured process that uses a series of questionnaires or "rounds" to gather information.<sup>14</sup> All of the candidate variables, items, and subitems were sent to participating doctors who had agreed to participate. If more than 5% of the items were not addressed, the form was returned to the sender to complete the ratings. The ratings were compiled so as to obtain the averages, medians, interquartile ranges for each variable, item, and subitem. A second rating form was sent to each doctor who replied in the first round, comprising the first ratings of the first round and the comments. The final rating (from 1 to 4) was determined based on calculation of the median for each of the variables, items, and subitems.

## 3 | RESULTS

### 1. Databases

Agreement to participate was obtained from 28 physicians (14 units) out of 64 (Figure 1). The 5 databases were partitioned into 7 listed areas.



**FIGURE 1** Delphi flow chart

## 2. Results of the first round

A first response was obtained from 18 doctors out of 28 (64%), representing 10 units (71%). Of the 18 forms received, 3 had been filled out jointly (a single form for 2 doctors) and 4 forms were more than 5% unanswered. All up, 15 usable forms (54%) were obtained.

## 3. Results of the second round

The 15 usable forms were resent to the 18 participating doctors. Thirteen forms were returned with changes that had been made to them. For the 2 other forms, the rating was deemed to be unchanged. All up, there were 15 forms that could ultimately be analysed.

## 4. Synopsis

The ratings included 65 variables, 90 items, and 17 subitems (Table 1). Of the 65 variables, 48 (74%) were considered to be indispensable, 16 (25%) optional, and 1 (2%) was deemed to be

useless. Of the 90 items, 62 (69%) were considered to be relevant, 23 (26%) of little relevance, and 5 (6%) as not relevant. Of the 17 subitems, 9 (53%) were considered to be relevant, 6 (35%) of little relevance, and 2 (12%) as not relevant (Table 1). The results for the variables, items, and subitems retained are available in the Supporting Information.

## 4 | DISCUSSION

This study allowed for determination of the variables retained for establishing a common French database. Thus, 64 obligatory or optional variables could be used, while 62 items and 9 subitems could be considered to be of relevance.

The VPS database (available in 2013) comprises 74 variables, 160 items, and 6 subitems; the ANZPIC database (2013) comprises 52 variables, 97 items, and no subitems. The number of variables selected

**TABLE 1** Summary of the medians of the variables, items, and subitems

Categories	Total Number of Variables	Number of Variables that Have a Median of	Total Number of Items	Number of Items that Have a Median of	Total Number of Subitems	Number of Subitems that Have a Median of
		1—Indispensable		1—Relevant		1—Relevant
		2—Optional		2—Little relevance		2—Little relevance
		3—Useless		3—No relevance		3—No relevance
Hospital	16	9	7	5	3	1
		7		2		2
		0		0		0
Patient	17	11	23	14	1	0
		5		6		1
		1		3		0
Medical data	11	9	17	11	2	0
		2		5		0
		0		1		2
Discharge form	10	10	13	11	1	0
		0		1		1
		0		1		0
Follow-up at 30 days	2	0	4	0	0	0
		2		4		0
		0		0		0
Nosocomial infections	7	7	24	20	10	8
		0		4		2
		0		0		0
Procedures and diagnostics	2	2	2	1	0	0
		0		1		0
		0		0		0
Total N (%)	65 (100)	48 (74)	90 (100)	62 (69)	17 (100)	9 (53)
		16 (25)		23 (26)		6 (35)
		1 (2)		5 (6)		2 (12)

in this study was close to the PICANet base (2013), which has 52 variables, 135 items, and 28 subitems.

The number of databases has increased significantly over the past decade, providing support for multiple epidemiological studies.<sup>15</sup> This increase in number is driven by clinicians seeking to better understand and improve their practice. Wetzel defined the variables to be collected for a database as being dependent on the desired objective. Common demographic variables (eg, age and gender) are necessary, as are as specific indicators of paediatric critical care (eg, rates of readmission, duration of the stay, and mortality in particular).<sup>15</sup> The variables, items, and subitems selected in our database meet these objectives. Based on the data collected by the Intensive Care National Audit and Research network in the UK, West et al compiled the data for 65 PICUs with 168 patients, showing that the availability of the medical and paramedical personnel was associated with better survival of the critical care patients.<sup>16</sup> In Italy, using the Italian Coronary Artery Bypass Graft Surgery network comprising over 34 000 patients, D'Errigo et al were able to show a variability in the mortality rate of more than 10% between the various centers.<sup>17</sup> Wetzel has reported that economic considerations could be associated with clinical data.<sup>15</sup> In this regard,

Kramer et al have shown that the first day of hospitalization and the first day of mechanical ventilation greatly increase the total cost of the stay, and that mortality was associated with a substantial increase in hospital costs.<sup>18</sup> Finally, the collection of scores for severity and dysfunction of organs allows for comparison of the observed and the predicted mortalities, and it allows the intraunit and interunit progression to be followed.<sup>8-10,19</sup>

Our study has several limitations. We submitted the rating of the variables to doctors of the GFRUP who were interested in the project, although they were not “experts” in this area. The participants who selected the variables, items, and subitems were a small proportion of the total number of physicians in French PICUs (ie, 28 physicians out of 64). As pointed out by Wetzel, however, the most important factor for the development of such networks is the involvement of participating centres and the ease of the collection. The second limitation is in regard to the Delphi method: We did not hold a face-to-face collective meeting that convened the doctors voting in the first and the second round of the rating. However, for the second round of voting, all of the comments from the experts were submitted to all of the voters.

The next stage will be the collection of the indicators of structure of the 32 French PICUs and then the implementation of the collection

of the patients' data. This second phase will require the development of technical digital information tools that allow for automated extraction of data from the patient files.

## CONFLICT OF INTEREST

None.

## AUTHOR CONTRIBUTIONS

Stéphane Leteurtre and Francis Leclerc participated in the organization and the management of this research project. Morgan Recher and Caroline Bertrac carried out the data collection. Morgan Recher, Camille Guillot, Jean Benoit Baudelet, Yasemin Karaca-Altintas, and Hervé Hubert participated in the interpretation of the data as well as writing and proofreading of the manuscript.

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## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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