# Current practice of gastro-intestinal endoscopy in children in Belgium.

Ellen Peeters[1,2], Elisabeth De Greef[1,2], Patrick Bontems[3], Ilse Hoffman[4], Etienne Sokal[5], Els Van De Vijver[6], Saskia Vande Velde[7], Louis Liesenborghs[8], Yvan Vandenplas[2]

[1] ZNA K. Paola Kinderziekenhuis, Department of paediatric gastroenterology, Antwerp, Belgium
[2] KidZ Health Castle, Department of paediatric gastroenterology, Jette, Belgium
[3] Hôpital Universitaire des Enfants Reine Fabiola, Université Libre de Bruxelles, Department of paediatric gastroenterology, Brussels, Belgium
[4] UZ Leuven, Department of paediatric gastroenterology, Leuven, Belgium
[5] UCL, Saint-Luc, Department of paediatric gastroenterology, Brussels, Belgium
[6] UZ Antwerp, Department of paediatric gastroenterology, Antwerp, Belgium
[7] Ghent University Hospital, Department of paediatric gastroenterology, Ghent, Belgium
[8] RIZIV, Department of Medical Care, Medical Management, Brussels, Belgium

Ellen.peeters@zna.be

## Key words

endoscopy, paediatric gastroenterology, oesophagogastroduodenoscopy, RIZIV/INAMI

## Abstract

**Introduction**

In order to develop a paediatric-specific training curriculum, an attempt was made to document the number of gastro-intestinal endoscopic procedures performed in children in Belgium, in the North of the country and Brussels.

**Methods**

The national registration system, the "Rijksinstituut voor Ziekte- en Invaliditeitsverzekering"(RIZIV)/ "Institut National d'Assurance Maladie-Invalidité" (INAMI) has been contacted to provide data on endoscopic procedures in children and registration numbers of the physicians performing endoscopy. Each technical procedure that is performed is registered by its unique procedural code and registration number of the performing physician. Depending on the physician's specialty training, the registration number is different. This was compared to the numbers from the main paediatric gastroenterology services in the country, which provided their numbers to double check the accuracy of the numbers provided by the RIZIV/INAMI.

**Results**

The most frequently performed procedures were oesophagogastroduodenoscopy (OGD) (n=4410) and ileocolonoscopy (IC) (n=69). Compared to the information obtained by hospitals, the national registration system seems not to register all paediatric procedures performed by paediatricians. Paediatric endoscopy is performed in many centres in Belgium resulting in a relatively low number of procedures per endoscopist.

**Discussion/conclusion**

The different reasons for incomplete registration by the national registration system need clarification. According to the recommendations provided by different societies of Paediatric Gastroenterology, Hepatology and Nutrition, centralization of procedures could be beneficial for paediatric care as well was the recognition of the paediatric subspecialty. However, the instauration of an adequate national registration system should be the first goal.

## Introduction

Gastro-intestinal endoscopy is increasingly performed in children since the 1960's. Healthcare policy emphasizes the importance of safety, quality and cost-effectiveness of care. A key aspect of paediatric gastroenterology practice is the ability to perform endoscopy in an efficient and safe way[1,2].

In Belgium, every paediatrician is allowed to perform endoscopy in children without any recognized training because paediatric gastroenterology is not recognized as a paediatric subspecialty by the Belgian government. Nevertheless, paediatric gastroenterology is recognized as a paediatric subspecialty in different European countries, the US, Canada and Australia. Similar to endoscopy in adults, performing an endoscopy in a child requires acquisition of technical, cognitive and integrative competencies to effectively diagnose and manage gastrointestinal disorders in children.

The first aim of the authors was to monitor current paediatric endoscopy practice in Belgium. Secondly, our aim was to compare these figures with data from different hospitals in Belgium and to investigate if these data correspond.

Once this information is obtained, recommendations about health care organisation can be formulated[2,3].

## Methods

The national registration system, the "Rijksinstituut voor Ziekte- en Invaliditeitsverzekering"(RIZIV)/ "Institut National d'Assurance Maladie-Invalidité" (INAMI) was contacted to obtain information regarding different gastro-intestinal endoscopic procedures in children and the physician who performed the procedure. The RIZIV/INAMI was asked to provide the number of diagnostic endoscopic procedures performed including oesophagoscopy, oesophagogastroduodenoscopy (OGD), rectoscopy, left colonoscopy, total colonoscopy and ileocolonoscopy (IC). Therapeutic procedures were duodenal catheterisation, percutaneous endoscopic gastrostomy tube placement (PEG), oesophageal dilatation, retrieval of foreign bodies, polypectomy, treatment of oesophageal varices (banding/ligation) and treatment of bleeding. Each technical procedure performed is registered by its unique procedural code and the performing physician's registration number. Depending on the physician's specialty training, the registration number is different. Data from the year 2015 were obtained.

We contacted the head of paediatric gastroenterology department of different University Hospitals in Belgium, mainly Flanders and Brussels, and asked to provide complete figures of paediatric endoscopy performed in their hospital in 2015. We received data from 7 Hospitals: UZ Ghent (UZG), UZ Antwerp (UZA), UZ Leuven (UZL), HUDERF, St Luc, and KidZ Health Castle in Brussels (KHC).

## Results

The RIZIV/INAMI provided the data from 2015. Endoscopic procedures are categorized in 2 categories depending on the age of the child: patients > 7 years of age or patients < 7 years of age. The former has the same procedural code as

an adult. As a consequence, the figures in older children are estimates. For the procedures performed in patients > 7 years, there is no differentiation possible between children (patients under the age of 16) and adults purely based on the procedural code. We therefore assumed that all procedures carried out by a paediatrician, were performed in children. This evaluation is merely a minimum of paediatric procedures as it remains unclear how many children > 7 years had endoscopic procedures done by adult gastroenterologists.

The investigated endoscopic paediatric procedures are divided in diagnostic and therapeutic procedures. The diagnostic procedures that are most frequently performed are oesophago-gastro-duodeno-scopy (OGD) (n= 4410) and (ileo-) colonoscopy (IC) (n=69).

1552 OGDs, or 0.5% of the total number of OGDs, were performed in children under 7 years old. 1498 (96.5%) OGDs were done by 64 paediatricians, in the other 3.5%, an adult gastroenterologist was the performing doctor. In patients older than 7 years, 2858 OGDs were performed by 62 paediatricians. Consequently, at least 4410 OGD's were registered in children, performed by 64 different paediatricians (Table 1). 3044/4410 (69%) of these procedures were performed in 6 university centres: 720 in the KidZ Health Castle, 643 in UZ Leuven, 380 in UZ Ghent, 190 in UZ Antwerp, 604 in HUDERF Hospital and 507 in St Luc Hospital (Table 3,4).

**Table 1**

| Procedure (code) | N | Paed | KHC | UZG | UZL | UZA | HUDERF | St Luc |
|---|---|---|---|---|---|---|---|---|
| Total amount of upper diagnostic endoscopies in children | | | 719 | 380 | 643 | 190 | 604 | 507 |
| esophagoscopy (472356) | | | 3 | | | | | |
| <7years | 4 | 1 | | | | | | |
| ≥7years | 2758 | 4 | | | | | | |
| fibroduodenos-copy (473056) | | | 716 | | 643 | 190 | 604 | 507 |
| <7years | 1552 | 1498 | 402 | | 231 | 85 | | |
| ≥7years | 322144 | 2858 | 314 | | 412 | 105 | | |

According to the National Registry, rectoscopy in children <7 years old, was performed 95 times. During 2015, the registration code of rectoscopy changed, resulting in less reliable numbers.

The registration counted 35 rectoscopies by a paediatrician, 48 by a surgeon and 12 by an adult gastroenterologist. 92% of the rectoscopies were in children under the age of 7 years old. In older children, most rectoscopies were done by surgeons resulting in unreliable figures in children between 7 and 16 years old. We were not possible to collect separate data from the different endoscopic centres.

**Table 2:** Data RIZIV/INAMI compared to hospital registration

| Procedure (code) | N | Paed | KHC | UZG | UZL | UZA | HUDERF | St Luc |
|---|---|---|---|---|---|---|---|---|
| left colonoscopy/ rectosigmoidos-copy (472452) | | | 143 | | 78 | | 40 | |
| <7years | 152 | 135 | 109 | | 32 | | | |
| ≥7years | 51579 | 117 | 34 | | 46 | | | |
| total colonoscopy (473174) | | | 33 | | 26 | | 29 | |
| <7years | 17 | 17 | 10 | | 7 | | | |
| ≥7years | 97731 | 54 | 23 | | 19 | | | |
| ileoscopy (473432) | | | 38 | | 104 | 55 | 50 | 65 |
| <7years | 8 | 5 | 8 | | 14 | 18 | | |
| ≥7years | 62371 | 61 | 30 | | 90 | 37 | | |

N= number according to the RIZIV/INAMI data provided
Paediatricians = number of paediatric endoscopists according to the RIZIV/INAMI data

Left colonoscopy/rectosigmoidoscopy was performed 152 times in children under the age of 7 years. In 135 cases (89%), the procedure was carried out by a paediatrician; the others were mainly performed by adult gastro-enterologists. In patients above 7 years old, left colonoscopy was performed 117 times by 30 different paediatricians. 269 left colonoscopies were nationally registered in 2015, performed by at least 23 different paediatricians. The number of total colonoscopies performed in children was 71, by 20 different paediatricians. 23.9% of the colonoscopies were in children under the age of 7 years.

143 left colonoscopies were performed in the KHC. If the data from the RIZIV/ INAMI are correct, 109 (71% of total) left colonoscopies in the younger group were performed in the KHC, and 34/117 in children > 7 years old (Table 2, 3,4).

The total number of ileocolonoscopies registered in children was 69, performed by 10 paediatricians. About 11.6% (n=8) of the ileocolonoscopies in children was performed in children under the age of 7. In our hospital, we counted 38 procedures in all children. In the UZA, 55 ileocolonoscopies were performed (18 < 7) and in the Saint-Luc Hospital 65 paediatric ileocolonoscopies were carried out (Table 2,3,4). In Leuven and in Huderf, respectively 104 and 50 ileocolonoscopies were performed in 2015.

The therapeutic procedures considered are: PEG placement, oesophageal dilatation, retrieval of foreign bodies, polypectomy, treatment of oesophageal varices (banding/ ligation) and treatment of bleeding.

The national registry counted 41 gastrostomies in children <7 years old, performed by 33 different paediatricians, and at least 66 paediatric procedures in older children. In our hospital, KHC, we counted 24 gastrostomy placements, 25% of the total procedures. In the HUDERF Hospital, they registered 2 gastrostomies by paediatricians. In the UZA, 30 gastrostomy placements occurred in 2015, 22 in children under the age of 7 and 8 in older children (Table 3,4). In UZL, another 5 gastrostomy placements were performed.

According to the data from the RIZIV/INAMI, oesophageal dilatation was registered 26 times in children <7 years old, and was performed by only four paediatricians. Of the 827 oesophageal dilatations in patients above 7 years old, only one was registered as performed by a paediatrician, the rest was, according to the national registry, performed by surgeons. No adult gastroenterologists were registered in the RIZIV/INAMI data. However, in our centre, oesophageal dilatation was done 13 times, mainly in young children (n=12). In the UZA and the HUDERF, 4 dilatations were done in each centre. In UZL, 18 dilatations were done, 7 in children under the age of 7, and 11 in older children.

Removal of foreign bodies was registered 104 times in young children, 60 times done by a paediatrician and at least 21 times in children of 7 or older. In KHC, we registered 30 of these procedures, 16 in children <7 years old, 14 times in older children. Also, in the HUDERF hospital, 16 removals of foreign bodies were carried out. We do not have the data of the other hospitals (Table 3,4).

Polypectomy was registered 3 times in children under the age of 7 by the RIZIV/ INAMI. In the KHC we performed in total 7 polypectomies, 5 times in children under the age of 7, 2 times in older children. Also in the UZA and UZL, 3 polypectomies were registered in total; and 6 polypectomies in HUDERF (Table 3,4).

According to the data from the RIZIV/INAMI, endoscopic treatment of oesophageal varices was only performed once in a child <7 years old, and this procedure was done by an adult gastroenterologist.

Above 7 years old 4 ligations were performed by 2 paediatricians (Table 1,2). However, according to the data we collected, one variceal treatment was done in a child under the age of 7, and 3 were done in older children, by a paediatrician in the KHC (Table 3,4). Another two and one were registered respectively in the UZL and HUDERF.

## Discussion

Our findings allow two important conclusions. First, the figures from the national registration system seem not in agreement with the data we collected from the different University Hospitals, suggesting an underregistration by the RIZIV/INAMI both for diagnostic and therapeutic procedures. For example, about 70% of OGD were performed in five different hospitals from which we collected data. Regarding ileocolonoscopy, data of three hospitals are almost the double of the registered numbers by the government. Regarding therapeutic endoscopic procedures, most obvious for polypectomy and variceal ligation, an underregistration by the RIZIV/ INAMI is clear. Three polypectomies were registered by the RIZIV/INAMI but five were performed in KHC, one hospital only, which was an unexpected finding. Also considering gastrostomies, are the numbers incorrect or are they unclear, because part has been carried out by surgeons. A reason for this underregistration can be

that the RIZIV/INAMI serves as an insurance organization, and does not act as an official registration database of all medical data. A possibility is that registration by the hospital and/or the endoscopy performers is incorrect.

The main goal is to make health insurance correct and affordable by the government. The RIZIV/INAMI receives data depending on the certificates with the correct registration code on it, that are provided by the doctors and the hospitals. They depend on the mutuality, the health insurance companies and communication to the RIZIV/INAMI of the latter.

Secondly, as the number of performing physicians is high compared to the total number of endoscopies performed, we may argue that the lower patient load may influence endoscopic skills. Good news is that the largest amount of endoscopy is performed in university hospitals following the available data and therapeutic procedures are carried out by only a small group of paediatricians. 68,8% of diagnostic upper endoscopies is carried out in the, in this article mentioned, 6 University Hospitals. Considering lower diagnostic endoscopies, 409 paediatric procedures were registered by the RIZIV/INAMI, were as in the 6 University Hospitals mentioned before: 661 lower endoscopies were counted, 60% more than the RIZIV/INAMI show.

Since paediatric gastroenterology is not a recognized subspecialty, the physician registration number does not allow us to differentiate between a paediatric gastroenterologist and a general paediatrician with a specific interest in gastroenterology.

There is general consensus that experience and thus activity and exposure are mandatory conditions to deliver high quality health care. Especially diagnostic endoscopy is performed in many centres in Belgium resulting in a relatively low number of procedures per paediatrician.

The latter together with our first finding, suspicion of incomplete and incorrect registration, can be questioned when considering quality of care. Recent studies showed that emergency department visits and readmissions after endoscopic procedures vary significantly across different hospitals. There is a decreasing trend of readmission secondary to the performed procedure when this was carried out in a centre with a high frequency [5,6]. The relation between procedural volumes and morbidity is well-documented in the adult population. Paediatric endoscopy is, as important as adult care, a target for quality improvement of medical care [5,6]. The first step towards improvement of the quality of healthcare might be governmental recognition of the subspecialty. This would guarantee that the majority of paediatric endoscopic procedures will be performed by a subspecialist, well-trained paediatricians. It would be preferable to demand a proof of continuous education, training, and activities over the past years.

Centralization of (a part of the) procedures, together with uniform standards of registration across centres will improve and ensure data collection. This improvement of national multicentrea data is extremely helpful for benchmarking purposes when tracking individual institutional data and developing quality programs for paediatric endoscopic procedures. Monitoring the quality of paediatric endoscopy can help identify potential areas for intervention [7].

Over the past decades, the incidence of endoscopy in children has increased. The most frequently performed endoscopic procedures in children are diagnostic OGD and left colonoscopy. The number of paediatricians performing therapeutic endoscopic procedures remains small (Table 3, [8]).

Adult gastroenterologists are allowed to perform endoscopies in children. Some therapeutic procedures are so seldom in children that they are preferably performed by an adult gastroenterologist who have much more technical experience. But endoscopy is more than the technical act: indication and interpretation of findings differ between children and adults. Paediatric endoscopic procedures require an adequate setting in a child-friendly environment with paediatric-sized equipment. Moreover, paediatric gastrointestinal disease origin, course and treatment purposes differ from adult GI disease. Thus, correct indications, disease stratification, appropriate and adapted communication with children of different age and their parents, require an experienced team of dedicated nurses, anaesthesiologists and doctors. Concluding that paediatric healthcare is high-specialized care [9].

## Conclusion

Paediatric endoscopy should be part of the national program towards ¬optimisation of paediatric care through quality improvement and patient-oriented medicine. The reasons for incomplete registration by the national registration system need clarification. There is a need to monitor current practice in paediatric endoscopy correctly and to use the results of this monitoring to improve quality of care. Consequently, the instauration of an adequate national registration system should be the first goal. Governmental recognition of the subspecialty would guarantee that endoscopy is performed by well-trained paediatric gastroenterologists.

Consequently, a specific training curriculum in paediatric gastroenterology should be put in place, as it is already today in many other countries.


## Acknowledgements:

The authors thank all paediatricians from the different University Hospitals to share their registration of endoscopic procedures.


**Table 3:** Data according to national registration by RIZIV/INAMI

| Procedure (code) | N | Paed | N° paed | surg | Adult GE |
|---|---|---|---|---|---|
| esophagoscopy (472356) | | | | | |
| <7years | 4 | 1 | 1 | 0 | 0 |
| >7years | 2758 | 4 | 4 | 1 | 1330 |
| fibroduodenoscopy (473056) | | | | | |
| <7years | 1552 | 1498 | 64 | 0 | 53 |
| >7 years | 322144 | 2858 | 62 | 1014 | 310625 |
| duodenal catheterisation (112254) | | | | | |
| <7 years | 4 | 3 | 3 | 0 | 0 |
| >7 years | 212 | 99 | 3 | 20 | 18 |
| duodenal catheterisation (474272) in child <7 years old | 29 | 33 | 5 | 0 | 0 |
| left colonoscopy/ rectosigmoidoscopy (472452) | | | | | |
| <7 years | 152 | 135 | 23 | 0 | 16 |
| >7years | 51579 | 117 | 30 | 586 | 49342 |
| total colonoscopy (473174) | | | | | |
| <7years | 17 | 17 | 8 | 0 | 0 |
| >7 years | 97731 | 54 | 20 | 892 | 94795 |
| ileoscopy (473432) | | | | | |
| <7 years | 8 | 5 | 2 | 0 | 3 |
| >7 years | 62371 | 61 | 10 | 0 | 60936 |
| esophageal dilatation (472091) | | | | | |
| <7 years | 26 | 26 | 4 | 0 | 1 |
| >7 years | 827 | 1 | 1 | 826 | 0 |
| treatment varices (473270) | | | | | |
| < 7 years | 1 | 0 | 0 | 0 | 1 |
| >7 years | 536 | 4 | 2 | 0 | 532 |
| treatment of bleeding (473771) | 793 | 0 | 0 | 0 | 793 |
| removal foreign body (472393) | | | | | |
| <7 years | 104 | 60 | 26 | 0 | 39 |
| >7 years | 3083 | 21 | 13 | 7 | 2904 |
| gastrostomy (355950) | | | | | |
| <7 years | 41 | 33 | 10 | 1 | 4 |
| >7 years | 883 | 66 | 14 | 26 | 758 |
| polypectomy (473211) | | | | | |
| <7 years | 3 | 2 | 2 | 0 | 1 |
| >7 years | 60474 | 3 | 3 | 0 | 60471 |
| rectoscopy (472511) > 7 years old | 46058 | 8 | 5 | 4429 | 40008 |
| rectoscopy in child <7 years old | 95 | 35 | 15 | 48 | 12 |

**Table 4:** Data RIZIV (N) compared to registration in different hospitals

| Procedure (code) | N | Paed | KHC | UZG | UZL | UZA | HUDERF | St Luc |
|---|---|---|---|---|---|---|---|---|
| Total amount of endos-copies in children | | | 719 | 380 | 643 | 190 | 604 | 507 |
| esophagoscopy (472356) | | | 3 | | | | | |
| <7years | 4 | 1 | | | | | | |
| >7years | 2758 | 4 | | | | | | |
| fibroduodenoscopy (473056) | | | 716 | | 643 | 190 | 604 | 507 |
| <7years | 1552 | 1498 | 402 | | 231 | 85 | | |
| >7 years | 322144 | 2858 | 314 | | 412 | 105 | | |
| duodenal catheterisation (112254) | | | | | | | | |
| <7 years | 4 | 3 | | | 7 | | | |
| >7 years | 212 | 99 | | | 6 | | | |
| rectoscopy (472511) | | | | | | | | |
| <7 years | 61 | 2 | | | 7 | | | |
| > 7years | 46058 | 8 | | | 5 | | | |
| left colonoscopy/ rectosigmoidoscopy (472452) | | | 143 | | 78 | | 40 | |
| <7 years | 152 | 135 | 109 | | 32 | | | |
| >7years | 51579 | 117 | 34 | | 46 | | | |
| total colonoscopy (473174) | | | 33 | | 26 | | 29 | |
| <7years | 17 | 17 | 10 | | 7 | | | |
| >7 years | 97731 | 54 | 23 | | 19 | | | |
| ileoscopy (473432) | | | 38 | | 104 | 55 | 50 | 65 |
| <7 years | 8 | 5 | 8 | | 14 | 18 | | |
| >7 years | 62371 | 61 | 30 | | 90 | 37 | | |
| esophageal dilatation (472091) | | | 13 | | | | 4 | |
| <7 years | 26 | 26 | 12 | | 7 | 4 | | |
| >7 years | 827 | 1 | 1 | | 11 | 0 | | |
| treatment varices (473270) | | | 4 | | | | 1 | |
| < 7 years | 1 | 0 | 1 | | 0 | | | |
| >7 years | 536 | 4 | 3 | | 2 | | | |
| treatment of bleeding (473771) | 793 | 0 | | | | | | |
| removal foreign body (472393) | | | 30 | | | | 16 | |
| <7 years | 104 | 60 | 16 | | | | | |
| >7 years | 3083 | 21 | 14 | | | | | |
| gastrostomy (355950) | | | 24 | | | | 2 | |
| <7 years | 41 | 33 | 12 | | 4 | 22 | | |
| >7 years | 883 | 66 | 12 | | 1 | 8 | | |


REFERENCES:

1. Walsh CM1. Training and Assessment in Pediatric Endoscopy. Gastrointest Endosc Clin N Am. 2016;26(1):13-33. doi: 10.1016/j.giec.2015.08.002.
2. Tringali A, Thomson M, Dumonceau J-M., Tavares M, Tabbers M.M., Furlano R. et al. Pediatric gastrointestinal endoscopy: European Society of Gastrointestinal Endoscopy (ESGE) and European Society for Pediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) Guideline Executive summary. Endoscopy 2017; 49:83-91.
3. Forget S, Walsh CM. Pediatric Endoscopy: Need for tailored approach to guidelines on quality and safety. J Gastroenterol, 2012; 26(10):735.
4. Friedt M., Welsch S. An update on pediatric endoscopy. Eur J of Med Research, 2013; 18:24.
5. Robert E. Kramer, et al. Quality Improvement in Pediatric Endoscopy: A Clinical Report From the NASPGHAN Endoscopy Committee. JPGN 2017;65:125–131.
6. Arca MJ, Rangel SJ et al. Case volume and Revisits in Children Undergoing Gastrostomy Tube Placement. JPGN 2017; 65(2):232-236.
7. Tringali A., Balassone V., De Angelis P., Landi R. et al. Complications in pediatric endoscopy. Best Pract and Res Clin Gastroenterology 2016;30: 825-839.
8. Franciosi JP et al. Changing indications for upper endoscopy in children during a 20-year period. J Pediatr Gastroenterol Nutr 2010; 51:443-447.
9. Oliva S, Thomson M, et al. Endoscopy in Pediatric Inflammatory Bowel Disease: A Position Paper on behalf of the Porto IBD Group of the European Society for pediatric Gastroenterology, Hepatology and Nutrition. JPGN 2018;67(3): 414-430.