

Publications on paediatric anaesthesia: a quantitative analysis of publication activity and international recognition

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A comprehensive compilation of the current international literature on paediatric anaesthesia is lacking. The aim of this study was to identify all articles on clinical practice in paediatric anaesthesia, to name the respective journals, and to assess the publication activity and international recognition of selected countries for a 6-yr period (1993–1998). The search comprised an article-to-article evaluation ('hand search') of 12 peer-reviewed anaesthesia journals, as well as an Internet-based ('SilverPlatter') Medline™-search (3,900 medical journals, US National Library of Medicine), both limited to original articles, case reports, reviews and editorials. Selected physical characteristics, for example the number of infants and children aged 0–14 yr old, the number of anaesthetists (specialists) and current impact factors (Science Citation Index) served to assess publication activity and international recognition. During the time period studied, 2259 articles (377/yr) were published on paediatric anaesthesia in 295 medical journals. The articles were primarily written in English (85.1%) and the majority originated from the USA (35.4%) and the UK (12.6%). The largest number of publications (77.7%) appeared in 29 anaesthesia journals, all referenced in Medline™, with 46% being published by only five journals. Most authors published in journals of their home country/region. Authors from the UK ranked highest in publication activity, followed by those from Canada, Switzerland, Sweden and Denmark. The highest impact factor was achieved by US and UK authors. We conclude that publications on paediatric anaesthesia are clustered in a small number of journals and are written predominantly by authors from English-speaking countries, who achieved the highest international recognition.

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Interest in paediatric anaesthesia has been growing steadily in recent years and many specialists dedicate a large share of their professional activity to this field. Special societies for paediatric anaesthesia or sections within national anaesthesia councils are involved in developing guidelines for the practice of, and continuing education in, paediatric anaesthesia. In 1997, the US-Accreditation Council for Graduate Medical Education (ACGME) acknowledged the fellowship program for paediatric anaesthesia.¹

New medical information is communicated through international journals. The number of articles on specific topics such as paediatric anaesthesia, indicates current publication activity in the respective field. In addition to information transfer, peer-reviewed publication activity contributes to the visibility of individual authors within the medical community, and publications in highly ranked journals may promote their professional career as well as the likelihood of receiving funding from various sources.²

Our literature search failed to identify a quantitative evaluation of the spectrum of publications, authors and journals on paediatric anaesthesia. It was therefore the aim of this study to identify: all papers with a focus on anaesthesia in infants and children published over a 6-yr period; the respective journals; the publication activity and the international recognition achieved (according to impact factors) of the authors who were from several countries; and to characterize the publication patterns.

Methods

Data collection

The key words were selected either according to the subject (child, children, infant(s), baby, newborn, neonate(s), p(a)ediatric(s), p(a)ediatric an(a)esthesia) or to typical situations, procedures or problems, and environments in

paediatric anaesthesia (an(a)esthesia, analgesia, an(a)esthetic(s), intubation, postoperative pain, pain therapy, postan(a)esthesia care unit, postsurgical intensive care). The search was limited to original articles, case reports, reviews and editorials. It excluded letters to the editor, historical articles, reports of meetings and abstracts. The study period was 1993–1998.

Twelve peer-reviewed serial publications in the field of anaesthesia (*Acta Anaesthesiologica Scandinavica* [1 volume/10 issues per year], *Anaesthesia* [1/12], *Anästhesiologie-Intensivmedizin-Notfallmedizin-Schmerztherapie* [1/8 in 1993–1995, 1/10 in 1996, 1/12 in 1997–1998], *Anesthesia & Analgesia* [2/12], *Anesthesiology* [2/12], *British Journal of Anaesthesia* [2/12], *Canadian Journal of Anaesthesia* [1/12], *Der Anaesthesist* [1/12], *European Journal of Anaesthesiology* [1/6], *Paediatric Anaesthesia* [1/6; 1/7 in 1997], *Pain* [4/12; 5/15 in 1996–1998], *Regional Anesthesia*, 1998 renamed *Regional Anesthesia and Pain Medicine* [1/6]) were evaluated on an article-to-article basis ('hand search'^{3 4}). The annual number of articles was determined for each journal and the abstracts were searched for the selected key words. If one of the key words was identified, the publication was registered and the first page archived. The annual subject index of every periodical was also cross-checked for all key words to ensure identification of each article on paediatric anaesthesia.

The Medline™ database was searched by PC (WinSPIRS 2.0, SilverPlatter Information, Boston, USA). Boolean operations were used (variables were the selected key words and year of publication; the above-mentioned 12 periodicals were excluded). The computerized search allowed key word identification in the title, abstract, Medical Subject Headings (MESH), and address of origin. The Medline™ report was archived for each identified contribution, including the abstract and address of the authors.

Study selection

English abstracts of all initially identified articles were assessed for clinical practice of paediatric anaesthesia. Articles related to other fields of medicine, for example surgery, cardiology, immunology or experimental research, were excluded from further evaluation. Thus, a detailed report on endoscopic findings in children anaesthetized during the procedure was excluded. In contrast, a publication describing certain paediatric anaesthesia techniques during endoscopic procedures was included.

Formal analysis

The final sample was evaluated as to language and country of origin. The origin of publications was determined according to the following algorithm: (i) address of correspondence; (ii) address of the institution; or (iii) nationality of the first author shown in previous publications

by the same individual. If more than one address was indicated, the first one was used.

Physical characteristics, ranking and calculations

Numbers (1993–1998) of infants and children (aged 0–14 yr) and officially registered anaesthetists (specialists) were calculated and averaged, based on information provided by governments and national specialist societies of selected countries. The numbers of publications per 1 million children (PpmC; potential study population) and publications per 1000 anaesthetists (PptA; potential investigators) were determined by dividing the total number of relevant publications by the respective demographic factor.

It may be assumed that the number of publications together with the respective cumulative impact factor may serve to assess publication activity of a specific journal and of a country/region. Anaesthesia journals referenced in Medline™ were listed according to the number of articles on paediatric anaesthesia published during the 6-yr study period, and the respective impact factor (Science Citation Index) was averaged from 1993 to 1998.⁵ The cumulative impact factor for a journal (cIF-journal) resulted from the multiplication of the number of articles therein by the respective impact factor. The cumulative impact factor for a country (cIF-country) was calculated for the seven most active countries/regions (number of articles) by adding the respective cIF-journal values of the national authors. Additionally, the mean impact factor (mIF) for the average publication on paediatric anaesthesia was obtained for each of these countries by dividing cIF-country by the number of publications for each country.

Results

We identified 2259 publications on paediatric anaesthesia in 295 peer-reviewed journals for the years 1993–1998 (377/yr). More than 58% ($n=1325$) were published in 12 anaesthesia journals, and represent 8.7% of the total number of articles published therein ($n=15\,268$, 'hand searched'). A search of the Medline™ database yielded 934 articles published in 283 journals (initially 3135 in 590 journals). The articles were predominantly written in English (85.1%; Table 1) and originated in the USA or the UK (12.6% and 35.4%, respectively; Table 2).

Table 1 Language of publication

Language	<i>n</i>	%
English	1922	85.1
German	79	3.5
French	66	2.9
Other languages	192	8.5
Total	2259	100

With reference to PptA and PpmC (Table 3), authors from the UK published the largest number of articles (94.7 PptA; 28.3 PpmC), followed by those from Canada (77.4; 28.9), Switzerland (47.7; 30.3), Sweden (32.8; 27.9) and Denmark (30.9; 28.4). Considering the available manpower (anaesthetists) and the size of the potential study population

(infants and children), authors from the USA (24.7; 14.0), Japan (24.1; 8.6), Germany (8.4; 10.0) and Italy (5.2; 5.6) published a relatively smaller number of articles.

The annual number of publications on paediatric anaesthesia in the 12 hand-searched periodicals increased by 23.7% (from 194 to 240) from 1993 to 1998 (Table 4). For some journals, for example *Anesthesia & Analgesia* and *Paediatric Anaesthesia*, the increase was significantly greater (+80%: from 25 to 45; and +54%: from 61 to 94, respectively), whereas in others, for example *Canadian Journal of Anaesthesia* and *Masui* (Japan), there was a decrease over the same period (-86%: from 26 to 14; and -79%: from 28 to 6, respectively).

A total of 77.7% of all publications appeared in 29 anaesthesia journals listed in Medline™ (Table 5). Others were found in journals for various medical disciplines, for example surgery, intensive care medicine, emergency medicine, hygiene. Most articles ($n=1350$; 59.8%) were published in 15 serial anaesthesia journals from four English-speaking countries, that is USA (9), UK (4),

Table 2 Origin of publication (according to the address of correspondence)

Country	n	%
USA	800	35.4
United Kingdom	284	12.6
Canada	173	7.7
Japan	169	7.5
Scandinavia	144	6.4
Germany	123	5.4
France	121	5.4
Australia	46	2.0
Other European countries	224	9.9
Other countries, worldwide	175	7.7
Total	2259	100

Table 3 Demographic data and analysis of publication activity on paediatric anaesthesia for selected countries

¹US Department of Commerce, Economics and Statistics, Bureau of the Census, Washington DC, USA. ²Office for National Statistics, London, UK. ³Statistics Canada, Ottawa, Ontario, Canada. ⁴Foreign Press Center, Tokyo, Japan. ⁵Statistisches Bundesamt, Wiesbaden, Germany. ⁶Institute Nationale de Statistique et des Études Economiques, Paris, France. ⁷Istituto nazionale di statistica, Rome, Italy. ⁸Australian Bureau of Statistics, Belconnen, Australia. ⁹Statistiska centralbyrån-Statistics Sweden, Stockholm, Sweden. ¹⁰Bundesamt für Statistik, Sektion Information, Bern, Switzerland. ¹¹Central Bureau for Statistics, Den Haag, Denmark. ¹²Centraal Bureau voor de Statistiek, Voorburg, The Netherlands. ¹³Österreichisches Statistisches Zentralamt, Wien, Austria. ¹⁴Best possible estimate by the Japanese Medical Society, Sapporo Local Area Medical Network. *Listed according to the number of publications on paediatric anaesthesia during 1993–1998 ($n=1910$, other countries=349). #Number of infants and children (0–14-yr-old, mean value for 1993–1998). ⁵Anaesthetists ('specialists'), mean value for 1993–1998. CpA, children per anaesthetist; PptA, publications per thousand anaesthetists; PpmC, publications per million children.

Country*	Children#	Anaesthetists \$	CpA	Publications from 1993–1998		
				n	PptA	PpmC
USA	57 276 000 ¹	32 344	1771	800	24.7	14.0
United Kingdom	10 033 594 ²	3000	3345	284	94.7	28.3
Canada	5 996 200 ³	2236	2682	173	77.4	28.9
Japan	19 540 000 ⁴	7000 ¹⁴	2791	169	24.1	8.6
Germany	12 290 775 ⁵	14 633	840	123	8.4	10.0
France	11 466 000 ⁶	7960	1440	121	15.2	10.6
Italy	8 382 507 ⁷	9070	924	47	5.2	5.6
Australia	3 700 000 ⁸	1697	2180	46	27.1	12.4
Sweden	1 649 092 ⁹	1401	1177	46	32.8	27.9
Switzerland	1 154 000 ¹⁰	734	1572	35	47.7	30.3
Denmark	952 188 ¹¹	873	1091	27	30.9	28.4
Netherlands	3 787 400 ¹²	900	4208	20	22.2	5.3
Austria	1 392 621 ¹³	1227	1135	19	15.5	13.6

Table 4 Number of annual publications on paediatric anaesthesia in 12 'hand-searched' journals

PA, *Paediatric Anaesthesia*; A&A, *Anesthesia & Analgesia*; CJA, *Canadian Journal of Anaesthesia*; BJA, *British Journal of Anaesthesia*; ANSLY, *Anesthesiology*; ANSIA, *Anaesthesia*; AAS, *Acta Anaesthesiologica Scandinavica*; D-ANAE, *Der Anaesthetist*; AINS, *Anaesthesiologie-Intensivmedizin-Nofallmedizin-Schmerztherapie*; EJA, *European Journal of Anaesthesiology*; RA, *Regional Anesthesia*.

Year	PA	A&A	CJA	BJA	ANSLY	ANSIA	AAS	Pain	D-ANAE	AINS	EJA	RA	Total
1993	61	25	26	23	16	15	12	8	6	1	1	0	194
1994	65	20	39	26	25	14	5	6	6	6	1	3	216
1995	56	23	33	16	23	21	8	6	6	4	3	1	200
1996	73	32	35	24	24	17	10	10	5	6	5	3	244
1997	79	45	25	19	15	12	13	7	2	5	4	5	231
1998	94	45	14	22	19	11	10	3	13	1	6	2	240
Total	428	190	172	130	122	90	58	40	38	23	20	14	1325

Table 5 Publications on paediatric anaesthesia in 29 anaesthesia journals listed in Medline™

For each journal the total number of publications on paediatric anaesthesia (n , [1993–1998]), the respective percentage of all identified publications (%), the mean impact factor (1993–1998, ranking), as well as the respective cIF-journal (ranking) are listed. *Listed by the number of publications on paediatric anaesthesia during 1993–1998. # No impact factor available, journal not listed in 'Science Citation Index' (ISI).⁵ §Until 1996 published as 'Regional Anesthesia'. †No impact factor listed for the years 1993–1995. ‡No impact factor listed for the years 1993–1994. IF, impact factor; cIF-journal, cumulative impact factor for a journal (= [n] multiplied by [IF]); F, France; UK, United Kingdom; G, Germany; NA, not available.

Anaesthesia journals listed in Medline™*	n	% ($n=2259$)	IF [mean 1993–1998] (Rank)	cIF-journal [$n \times$ IF] (Rank)
<i>Paediatric Anaesthesia</i> (UK)	428	18.94	†0.813 (13)	347.97 (03)
<i>Anesthesia & Analgesia</i> (USA)	190	8.41	2.471 (04)	469.49 (02)
<i>Canadian Journal of Anaesthesia</i> (Canada)	172	7.61	1.302 (08)	223.94 (05)
<i>British Journal of Anaesthesia</i> (UK)	130	5.75	2.243 (05)	291.59 (04)
<i>Anesthesiology</i> (USA)	121	5.35	4.622 (01)	559.26 (01)
<i>Masui</i> (Japan)	92	4.07	NA #	NA #
<i>Anaesthesia</i> (UK)	90	3.98	1.807 (06)	162.63 (06)
<i>Journal of Clinical Anesthesia</i> (USA)	69	3.05	§0.855 (12)	59.00 (10)
<i>Acta Anaesthesiologica Scandinavica</i> (Denmark)	58	2.56	1.045 (10)	60.61 (09)
<i>Pain</i> (The Netherlands)	40	1.77	3.730 (03)	149.20 (07)
<i>Der Anaesthetist</i> (G)	38	1.68	0.678 (16)	25.77 (11)
<i>Cahiers d'Anesthésiologie</i> (F)	35	1.55	NA #	NA #
<i>Critical Care Medicine</i> (USA)	34	1.51	3.848 (02)	130.83 (08)
<i>Journal of Cardiothoracic and Vascular Anesthesia</i> (USA)	32	1.42	0.720 (14)	23.04 (12)
<i>Anestezjologija i Reanimatologija</i> (Russia)	28	1.23	NA #	NA #
<i>Revista Espanola de Anestesiologia y Reanimacion</i> (Spain)	25	1.11	NA #	NA #
<i>Anaesthesia and Intensive Care</i> (Australia)	23	1.02	0.941 (11)	21.64 (13)
<i>Anaesthesiologie-Intensivmedizin-Notfallmedizin-Schmerztherapie</i> (G)	22	0.97	0.690 (15)	15.18 (15)
<i>Minerva Anestesiologica</i> (Italy)	22	0.97	NA #	NA #
<i>European Journal of Anaesthesiology</i> (UK)	20	0.89	0.623 (17)	12.46 (16)
<i>Annales Françaises d'Anesthésie et de Réanimation</i> (F)	17	0.75	0.317 (18)	5.39 (18)
<i>International Anesthesiology Clinics</i> (USA)	15	0.66	0.265 (19)	3.98 (19)
<i>Regional Anesthesia and Pain Medicine</i> (USA) [§]	15	0.66	1.287 (09)	19.31 (14)
<i>Acta Anaesthesiologica Sinica</i> (Taiwan)	12	0.53	NA #	NA #
<i>Anästhesiologie und Reanimation</i> (G)	9	0.40	NA #	NA #
<i>Acta Anaesthesiologica Belgica</i> (Belgium)	6	0.27	NA #	NA #
<i>Journal of Neurosurgical Anesthesiology</i> (USA)	6	0.27	1.342 (07)	8.06 (17)
<i>Anesthesia Progress</i> (USA)	5	0.22	NA #	NA #
<i>Klinische Anästhesiologie und Intensivtherapie</i> (G)	1	0.04	NA #	NA #
Total	1755	77.64	29.599	2579.98

Australia (1) and Canada (1), and ~ 46% ($n=1041$) in a total of five journals (*Paediatric Anaesthesia*, *Anesthesia & Analgesia*, *Canadian Journal of Anaesthesia*, *British Journal of Anaesthesia* and *Anesthesiology*). One-fifth of the articles ($n=428$; 18.9%) were published in the journal *Paediatric Anaesthesia*. The difference in the impact factor of the cited journals resulted in a different ranking of the cIF-journal. For example, the cIF-journal of some periodicals was high despite the relatively smaller number of publications during the study period (e.g. *Anesthesiology*, cIF-journal=559.26; $n=121$), compared with that of journals publishing a greater number of articles (e.g. *Paediatric Anaesthesia*, cIF-journal=347.97; $n=428$).

Most authors have published their work in anaesthesia journals of their respective country or region (Table 6). Similarly, the majority of periodicals was dominated by national authors, for example 64.9% of the articles in US journals were of US origin ($n=336$). This was found even more frequently in journals from non-English-speaking countries, for example Japan, France or Germany. However, British and Canadian periodicals, for example *Paediatric Anaesthesia*, *Canadian Journal of Anaesthesia*, showed a

greater diversity in authorship. More international representation in authorship was identified for journals published in English.

The cIF-country (Table 6) was higher for publications by US authors (1084.41), followed by the work of British (353.38) and Canadian groups (297.04). Accordingly, the calculated mIF-country was high for North American and British authors. However, publications from Scandinavia also achieved a high mIF-country (Table 7).

Discussion

General findings

There was a mean of 377 publications published each year on paediatric anaesthesia and most of the papers were written in English. The largest number of articles appeared in *Paediatric Anaesthesia*, *Anesthesia & Analgesia*, the *Canadian Journal of Anaesthesia*, the *British Journal of Anaesthesia* and *Anesthesiology*. British authors published most articles on the topic in relation to selected physical characteristics (e.g. age of the children and infants). Most

Table 6 Publications on paediatric anaesthesia from the seven most active countries (see Table 2) in 29 anaesthesia journals listed in Medline™ (see Table 5)

*Listed by the number of publications on paediatric anaesthesia during 1993–1998 [journals with no impact factor ('Science Citation Index', SCT⁵) are not included in this table]. *n*, number of publications on paediatric anaesthesia; IF, impact factor; cIF-j, cumulative impact factor for a journal (=IF multiplied by [IF]); cIF-country, cumulative impact factor for a country (=addition of all individual [cIF-j] for each country); F, France; UK, United Kingdom; G, Germany; Scand., Scandinavia.

Anaesthesia journals listed in Medline™ *	Number of publications (<i>n</i>) and their cumulative impact (cIF-j) from													
	USA <i>n</i>	(cIF-j)	UK <i>n</i>	(cIF-j)	Japan <i>n</i>	(cIF-j)	Canada <i>n</i>	(cIF-j)	Scandinavia <i>n</i>	(cIF-j)	France <i>n</i>	(cIF-j)	Germany <i>n</i>	(cIF-j)
<i>Paediatric Anaesthesia</i> (UK)	118	(95.34)	118	(16.26)	20	(17.07)	21	(16.26)	36	(29.27)	20	(16.26)	15	(12.20)
<i>Anesthesia & Analgesia</i> (USA)	129	(318.76)	1	(2.47)	12	(27.18)	11	(29.65)	6	(14.82)	12	(29.65)	3	(7.41)
<i>Canadian Journal of Anaesthesia</i> (Canada)	43	(55.99)	3	(3.91)	16	(110.67)	85	(20.83)	1	(1.30)	7	(9.11)	0	—
<i>British Journal of Anaesthesia</i> (UK)	3	(6.72)	60	(134.58)	6	(2.24)	1	(13.46)	17	(38.13)	11	(24.67)	6	(13.46)
<i>Anesthesiology</i> (USA)	77	(355.89)	1	(4.62)	14	(60.09)	13	(64.71)	3	(13.87)	4	(18.49)	2	(9.24)
<i>Anaesthesia</i> (UK)	2	(3.61)	53	(95.77)	2	(3.61)	2	(3.61)	7	(12.65)	1	(1.81)	0	—
<i>Journal of Clinical Anesthesia</i> (USA)	59	(50.45)	0	—	0	(0.86)	1	(0.86)	2	(1.71)	1	(0.86)	1	(0.86)
<i>Acta Anaesthesiologica Scandinavica</i> (Denmark)	0	—	2	(2.09)	2	(2.09)	0	(2.09)	36	(37.62)	3	(3.14)	3	(3.14)
<i>Pain</i> (The Netherlands)	13	(48.49)	2	(7.46)	0	(7.46)	20	(74.60)	2	(7.46)	1	(3.73)	0	—
<i>Der Anaesthesist</i> (G)	0	—	0	—	0	—	0	—	0	—	0	—	33	(22.37)
<i>Critical Care Medicine</i> (USA)	31	(119.29)	0	—	0	—	0	—	0	—	1	(3.85)	0	—
<i>Journal of Cardiothoracic and Vascular Anesthesia</i> (USA)	18	(12.96)	3	(2.16)	0	(0.72)	1	(0.72)	3	(2.16)	2	(1.44)	2	(1.44)
<i>Anaesthesia and Intensive Care</i> (Australia)	0	—	1	(0.94)	1	(0.94)	0	(0.94)	0	—	0	—	0	—
<i>Anaesthesiologie-Intensivmedizin-Notfallmedizin-Schmerzther</i> (G)	1	(0.69)	0	—	0	—	0	—	0	—	0	—	0	—
<i>European Journal of Anaesthesiology</i> (UK)	0	—	4	(2.49)	0	—	0	—	4	(2.49)	0	—	20	(13.80)
<i>Annales Françaises d'Anesthésie et de Réanimation</i> (F)	0	—	0	—	0	—	0	—	1	(0.32)	14	(4.44)	0	—
<i>International Anesthesiology Clinics</i> (USA)	12	(3.18)	1	(0.26)	0	—	0	—	0	—	1	(0.26)	0	—
<i>Journal of Neurosurgical Anesthesiology</i> (USA)	3	(4.03)	0	—	1	(1.34)	0	—	0	—	0	—	1	(1.34)
<i>Regional Anesthesia and Pain Medicine</i> (USA)	7	(9.01)	1	(1.29)	1	(1.29)	0	—	0	—	1	(1.29)	0	—
Total (cIF-country)	518	(1084.41)	250	(353.38)	167	(297.04)	155	(152.89)	119	(161.80)	105	(119.62)	101	(88.38)

Table 7 Mean impact factor of publications on paediatric anaesthesia

*Listed by the number of publications on paediatric anaesthesia from 1993 to 1998 (see Table 5). [§]mIF={cumulative IF-country, see Table 6} divided by [all publications in anaesthesia journals of the same country, (including articles in those journals, for which no impact factor was available; see Table 5)]

Country*	MIF [§]
USA	2.122
United Kingdom	1.414
Japan	0.916
Canada	1.916
Scandinavia	1.360
France	1.139
Germany	0.875

work originated from the USA and the UK. These articles were also published in the journals with the highest impact factors in the field, resulting in high international recognition.

Limitations and advantages of the applied method

The limitations of this exercise were that Medline™ (US National Library of Medicine, 1999) only references 3900 of ~165 000 published journals worldwide.⁶ Furthermore, we excluded book chapters, abstracts, popular science publications or rejected manuscripts, all of which reflect publication activity. The advantages of this restrictive approach were that all included articles underwent peer-review ensuring a specific level of quality, and that subjective or random factors such as accessibility were eliminated making the results reproducible. Furthermore, because only work on 'clinical' paediatric anaesthesia was included in our study, some publications with potentially relevant information may not have been identified.

The selection of key words and the criteria for inclusion or exclusion of the retrieved articles was dependent upon the decision of the investigators. Other search terms or selection criteria might have yielded different data. In addition, as the correspondence address listed may not always have represented the country of origin of all the authors involved, we were unable to quantify foreign contributions to specific papers.

Journals

Approximately 78% of all publications appeared in anaesthesia journals, and 46% of the articles were found in five periodicals (*Paediatric Anaesthesia*, *Anesthesia & Analgesia*, *Canadian Journal of Anaesthesia*, *British Journal of Anaesthesia* and *Anesthesiology*). While these journals may be of vital interest to paediatric anaesthetists worldwide, other anaesthesia journals may also be important, because for instance they reflect activities in the country of the respective reader.

Increases in the number of articles on paediatric anaesthesia (24%) were smaller than increases in publications on medical topics as a whole (33%).⁶ Larger or smaller increases in some journals may be a reflection of editorial board decisions. For example, *Anesthesia & Analgesia* became the official journal of the 'American Society of Pediatric Anesthesia' in 1996,¹ and the number of publications on paediatric anaesthesia increased accordingly. This may have led to fewer publications elsewhere, for instance in the *Canadian Journal of Anaesthesia* or in *Masui*. Alternatively, the impact factor of a journal (e.g. *Anesthesia & Analgesia*, IF=2.471; Table 5) could play an important role in manuscript submission. Some authors, for instance from Japan, may have preferred to submit their manuscripts there, which in turn, resulted in fewer submissions to Japanese journals.

Paediatric Anaesthesia has an important position with ~19% of all publications in the field, although the impact factor (0.813) is ranked relatively low. The relevance of the impact factor to estimate importance and quality of scientific output has become the subject of intense debate.⁷⁻¹⁵ It has been suggested that the impact factor reflects international recognition or 'visibility', rather than the quality or importance of certain periodicals or a researcher's work.¹⁶ Some journals may have an important role independent of their impact factor as they convey specific information for interested specialists.

Publication productivity and international recognition of different countries/regions

The largest proportion of publications on paediatric anaesthesia originated from the USA and the UK, which is in proportion to medical research output in general.⁶ American and British authors may publish more frequently, due to special mechanisms of fund-raising and career development in their home countries. The high productivity of anaesthetists from the UK and several smaller European countries, Switzerland, Sweden, Denmark, was to be expected as it is similar to the publication pattern in other medical areas.^{4 17-19} Differences in publication productivity between countries have been associated with differences in the respective medical systems and other factors such as language, training and funding.¹⁷

Alternatively, work from highly productive countries may have been published preferentially. A strong correlation between the origins of medical journals and the respective authors has previously been observed in related fields, for example anaesthesia, intensive care, emergency medicine and pain management.^{14 18 19} Apart from the scientific content, which is evaluated through a vigorous peer-review process, it has been suggested that acceptance of manuscripts may be influenced by various co-factors. For example, the probability of having an English language manuscript accepted is greater than the acceptance of a non-English version.²⁰ Furthermore, the majority of authors

publishing in highly ranked USA- or UK-based journals write in their native language, originate from countries with a high scientific reputation, and their reviewers may be from the same country. Thus, it has been suggested that work by Anglo-American authors is more likely to be accepted by Anglo-American journals, resulting in a certain publication bias.^{21–24}

Some of these factors may exert an additional influence on publication patterns in paediatric anaesthesia. However, our data appear to support the view that anaesthetists from certain countries, in relation to the respective available manpower and/or study population, are more active in communicating new information on paediatric anaesthesia to the scientific community. Together with the higher impact factors of the journals, this results in higher cumulative and mean impact factors for both North American and British publications, and thus in greater international recognition or ‘visibility’ (i.e. number of publications multiplied by the impact factor).¹⁶ The high cumulative and mean impact factors of some European countries/regions, may additionally result from the lack of non-English language anaesthesia journals in these countries, leading the authors to publish elsewhere.

In conclusion, *Paediatric Anaesthesia*, *Anesthesia & Analgesia*, the *Canadian Journal of Anaesthesia*, the *British Journal of Anaesthesia* and *Anesthesiology* are important journals for the paediatric anaesthetist, as they account for ~46% of all publications in this field. Publications on paediatric anaesthesia with the greatest international recognition (according to the impact factor) originated from the US and the UK. This may be due to a high publication productivity of authors from the respective countries, and certain co-factors supporting publication in the highly ranked USA- and UK-based periodicals. The ‘lingua franca’ of scientific publications is English, a factor that cannot be ignored by non-native speakers of English who wish to influence paediatric anaesthesia.

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