Pediatric and Adult Urological Publications: Trend over the Last 15 Years between 1996 and 2010

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Key Words

Pediatric urology • Meta analysis •
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Abstract

Purpose: The aim of this study was to determine the trends in urological publications from 1996 to 2010. **Methods:** We retrieved as many urology-related articles as possible from Medline articles between 1 January 1996 and 31 December 2010, and attempted to retrieve as many urology articles as possible from all Medline recorded journals (urology-specific and non-urology-specific journals indiscriminately), using the key words: “urology”, “pediatric urology”, “bladder”, “kidney” and others. The search was limited to “all adults” (i.e. adult urology), “all children” (i.e. pediatric urology) as well as female and male urology. We repeated the search by using a certain limit each time according to the publication types as classified by Medline, and collected the total number of publications per year for the 15 years of the specified period. Regression analysis was used to determine the effect of the publication year upon the number of publications of each type. **Results:** There was a steady increase over time in the number of total publications both in pediatric and adult urology, with a sharper rise in the number of meta-analysis publications. At the same time there was a decrease in the number of case reports over the last years. **Conclusions:** New medical information available to urology and pediatric urology specialists increases over time and thus increases

the academic burden. The increase in high quality medical publications and the decrease in some “low quality” publications in recent years may further show an increase in the level of evidence in each published urological study.

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Introduction

There has been a massive expansion in the amount of medical information available over recent years [1–4]. It appears that in some specific areas of medicine, the quality of the articles published may have improved as well [5, 6]. Critical assessment of published material is crucial not only for physicians who are seeking information in order to extend their knowledge and provide better care to their patients but also for patients who often rely on the internet as a source and are not always aware of the peer review process and may not be able to assess manuscript quality and reliability [3, 6].

Among various effective search engines, Medline, a free service offered by the US National Library of Medicine is readily available. Medline classifies publications as clinical trials, editorials, letters, meta-analyses, practice guidelines, randomized controlled trials (RCT),

Table 1. Types of urology publications by year and age group (adult or pediatric) [data are expressed as no. (%)]

Year	Total	CT	Editorials	Letters	MA	PG	RCT	Reviews	Case reports
1996 (adult)	5,714	886(15.5)	9(0.1)	145(2.5)	4(0.1)	4(0.1)	359(6.2)	360(6.3)	1487(26)
1996 (pediatric)	1,835	205(11.1)	120(0.6)	56(3)	3(0.1)	2(0.1)	46(2.5)	165(8.9)	458(24.9)
1997 (adult)	5,999	941(15.6)	12(0.2)	118(1.9)	4(0)	5(0)	359(5.9)	444(7.4)	1,521(25.3)
1997 (pediatric)	1,975	215(10.8)	9(0.4)	84(4.2)	3(0.1)	3(0.1)	63(3.1)	210(10.6)	525(26.5)
1998 (adult)	6,054	871(14.3)	11(0.1)	134(2.2)	6(0.1)	2(0)	332(5.4)	388(6.4)	1551(25.6)
1998 (pediatric)	1,984	230(11.5)	9(0.4)	70(4.5)	6(0.3)	0(0)	67(3.3)	188(9.4)	474(23.8)
1999 (adult)	5,839	960(16.4)	20(0.3)	131(2.2)	11(0.1)	2(0)	352(6)	331(5.6)	1464(25)
1999 (pediatric)	1,913	209(10.9)	17(0.8)	61(31.8)	4(0.2)	5(0.2)	54(2.8)	194(10.1)	482(25.1)
2000 (adult)	6,220	923(14.8)	14(0.2)	175(2.8)	8(0.1)	3(0)	362(5.8)	348(5.5)	1,485(23.8)
2000 (pediatric)	1,979	177(8.9)	14(0.7)	73(3.9)	4(0.2)	2(0.1)	50(2.5)	193(9.7)	469(23.6)
2001 (adult)	6,631	891(13.4)	12(0.1)	145(2.1)	10(0.1)	0(0)	404(6)	378(5.7)	1,609(24.2)
2001 (pediatric)	2,090	195(9.3)	12(0.5)	80(3.8)	4(0.1)	3(0.1)	77(3.6)	212(10.1)	462(22.1)
2002 (adult)	6,611	789(11.9)	14(0.2)	135(2)	19(0.2)	6(0)	415(6.2)	349(5.2)	1,621(24.5)
2002 (pediatric)	2,003	139(6.9)	10(0.4)	45(2.2)	6(0.2)	2(0)	63(3.1)	205(10.2)	454(22.6)
2003 (adult)	7,365	1037(14)	23(0.3)	140(1.9)	13(0.1)	9(0.1)	482(6.5)	464(6.3)	1,668(22.6)
2003 (pediatric)	2,117	176(8.3)	14(0.6)	74(3.4)	4(0.1)	9(0.4)	60(2.8)	197(9.3)	462(21.8)
2004 (adult)	7,914	1,111(14)	15(0.1)	164(2)	22(0.2)	2(0)	541(6.8)	522(6.5)	1,878(23.7)
2004 (pediatric)	2,266	193(8.5)	4(0.1)	80(3.5)	4(0.1)	3(0.1)	71(3.1)	260(11.4)	492(21.7)
2005 (adult)	8,559	1,229(14.3)	26(0.3)	177(2)	33(0.3)	2(0)	577(6.7)	435(5)	1,885(22)
2005 (pediatric)	2,415	215(8.9)	12(0.4)	68(2.8)	5(0.2)	3(0.1)	96(3.9)	234(9.6)	559(23.1)
2006 (adult)	9,172	1,303(14.2)	29(0.2)	249(2.7)	34(0.3)	6(0)	584(6.3)	404(4.4)	2,092(22.8)
2006 (pediatric)	2,543	215(8.4)	13(0.5)	80(3.1)	11(0.4)	4(0.1)	79(3.1)	242(9.5)	565(22.2)
2007 (adult)	10,143	1,506(14.8)	36(0.3)	284(2.7)	27(0.2)	5(0)	689(6.7)	456(4.4)	2,282(22.4)

CT = Clinical trial; MA = meta analysis; PG = practice guideline.

reviews, and others types of publications such as case reports.

The aim of this study was to test the hypothesis that the number of publications in pediatric and adult urology has increased over time in a linear fashion, and to verify whether the various categories of publications, as defined by Medline, have followed the same historic pattern over the last 15 years. We also aimed to test the hypothesis that the number of publications in female urology, compared to male urology, has also increased over time in a linear fashion, and to study the historical pattern of the various categories of publications in both fields (female and male-related) of urology.

Materials and Methods

The internet address, <http://www.ncbi.nlm.nih.gov/entrez>, was used to evaluate all Medline articles registered from 1 January 1996 to 31 December 2010. We focused on the fields of pediatric and adult urology using the keywords “urology”, “urinary

tract”, “prostate”, “urethra”, “testicles”, “genitalia”, “ureter”, “urinary bladder”, “epididymis”, and “nephrectomy”. The search was limited to “humans” and to “all children” (0–18 years) or “all adults” (19 years and above). By using these key words, we aimed to maximize the number of urology-related articles. The publications were limited to those written in English and the total number of publications per year for the 15 years of the specified period was collected. The search was repeated, using one limit at a time, according to the type of article based on the Medline classification: clinical trials, editorials, letters, meta-analyses, practice guidelines, RCT, reviews, and case reports. Similar analyses were also conducted while using the limit of gender (male only or female only). In order to verify that the categorization and tagging offered automatically by PubMed was accurate, we used a random sample of 10 studies each year. In 100% of the cases PubMed’s categorization was found to be accurate. There are however obvious overlaps: for instance, all RCT are also listed as clinical trials, and some papers, based on a case report and a review of the literature, are listed both among reviews and case reports.

The Minitab version 16.0 (State College, PA) was used for statistical analyses. Pearson regression analysis was used to determine the effect of the increasing year of publication upon the number of publications of each type. A p-value of < 0.05 was considered significant.

Table 2. Types of male and female urology publications by year [data are expressed as no. (%)]

Year	Total	CT	Editorials	Letters	MA	PG	RCT	Reviews	Case reports
1996 (male)	6,852	806(11.7)	84(1.2)	271(3.9)	9(0.1)	10(0.1)	268(3.8)	759(11)	1,154(16.8)
1996 (female)	5,982	667(11.1)	42(0.7)	186(3.1)	8(0.1)	7(0.1)	279(4.6)	585(9.7)	949(15.8)
1997 (male)	7,269	821(11.2)	82(1.1)	272(3.7)	9(0.1)	11(0.1)	269(3.7)	908(12.4)	1,204(16.5)
1997 (female)	6,204	712(11.4)	37(0.5)	187(3)	12(0.1)	7(0.1)	281(4.5)	748(12)	1,022(16.4)
1998 (male)	7,522	785(10.4)	62(0.8)	276(3.6)	11(0.1)	5(0)	265(3.5)	947(12.5)	1,238(16.4)
1998 (female)	6,250	666(10.6)	32(0.5)	188(3)	13(0.2)	2(0)	249(3.9)	757(12.1)	953(15.2)
1999 (male)	7,386	847(11.4)	63(0.8)	248(3.3)	12(0.1)	13(0.1)	292(3.9)	915(12.3)	1,204(16.3)
1999 (female)	6,051	695(11.4)	53(0.8)	177(2.9)	11(0.1)	5(0)	247(4)	669(11)	887(14.6)
2000 (male)	7,910	775(9.7)	79(0.1)	262(3.3)	24(0.3)	12(0.1)	285(3.6)	1,003(12.6)	1,161(14.6)
2000 (female)	6,540	672(10.2)	40(0.6)	210(3.2)	17(0.2)	3(0)	257(3.9)	794(12.1)	950(14.5)
2001 (male)	8,365	716(8.5)	53(0.6)	232(2.7)	22(0.2)	6(0)	288(3.4)	1,054(12.6)	1,252(14.9)
2001 (female)	6,846	661(9.6)	28(0.4)	192(2.8)	14(0.2)	5(0)	305(4.4)	799(11.6)	952(13.9)
2002 (male)	8,451	661(7.8)	62(0.7)	231(2.7)	29(0.3)	12(0.1)	313(3.7)	1,082(12.8)	1,220(14.4)
2002 (female)	6,785	558(8.2)	32(0.4)	162(2.3)	18(0.2)	9(0.1)	299(4.4)	825(12.1)	1,013(14.9)
2003 (male)	9,232	914(9.9)	83(0.8)	258(2.7)	22(0.2)	16(0.1)	393(4.2)	1,253(13.5)	1,213(13.1)
2003 (female)	7,238	706(9.7)	37(0.5)	195(2.6)	15(0.2)	16(0.2)	333(4.6)	863(11.9)	1,050(14.5)
2004 (male)	9,948	948(9.5)	80(0.8)	301(3)	39(0.3)	22(0.2)	421(4.2)	1,336(13.4)	1,395(14)
2004 (female)	7,574	758(10)	47(0.6)	231(3)	26(0.3)	20(0.2)	345(4.5)	906(11.9)	1,111(14.6)
2005 (male)	10,385	1,015(9.7)	89(0.8)	276(2.6)	45(0.4)	10(0)	438(4.2)	1,282(12.3)	1,389(13.3)
2005 (female)	8,263	846(10.2)	52(0.6)	227(2.7)	38(0)	7(0)	402(4.8)	937(11.3)	1,183(14.3)
2006 (male)	11,254	1,061(9.4)	92(0.8)	303(2.6)	51(0.4)	21(0.1)	439(3.9)	1,297(11.5)	1,559(13.8)
2006 (female)	8,656	903(10.4)	48(0.5)	231(2.6)	42(0.4)	20(0.2)	402(4.6)	915(10.5)	1,257(14.5)
2007 (male)	12,398	1,285(10.3)	203(1.6)	360(2.9)	37(0.2)	12(0)	532(4.2)	1,510(12.1)	1,619(13)
2007 (female)	9,429	1,051(11.1)	70(0.7)	277(2.9)	39(0.4)	12(0.1)	480(5)	1,006(10.6)	1,434(15.2)
2008 (male)	12,923	1,249(9.6)	320(2.4)	389(3)	62(0.4)	16(0.1)	540(4.1)	1,410(10.9)	1,603(12.4)
2008 (female)	9,837	1,038(10.5)	98(0.1)	268(2.7)	41(0.4)	16(0.1)	473(4.8)	950(9.6)	1,437(14.6)
2009 (male)	13,394	1,320(9.8)	304(2.2)	422(3.1)	81(0.6)	14(0.1)	562(4.1)	1,338(9.9)	1,590(11.8)
2009 (female)	10,264	1,072(10.4)	115(1.1)	290(2.8)	63(0.6)	14(0.1)	500(4.8)	927(9)	1,393(13.5)
2010 (male)	13,153	1,247(9.4)	269(2)	395(3)	84(0.6)	27(0.2)	565(4.2)	1,312(9.9)	1,459(11)
2010 (female)	10,026	1,046(10.4)	90(0.8)	302(3)	76(0.7)	22(0.2)	485(4.8)	1,017(10.1)	1,231(12.2)

CT = Clinical trial; MA = meta analysis; PG = practice guideline; RCT = randomized controlled trial.

Results

Adult versus Pediatric Analyses

During the evaluation period, Medline reported 248,569 publications for combined pediatric and adult urology publications of the above-mentioned categories (table 1). Over all, an increase was noticed from 12,600 publications in 1996 up to 22,483 by the end of 2010. When the analysis was limited to pediatric-only or adult-only urology publications over the whole study period, 112,707 adult publications and 33,351 pediatric publications were found. Thus 102,511 publications were not labeled as pediatric only or adult only and had a mixed or unknown study population.

Table 1 depicts year-by-year, the number of each type of publication in both pediatric and adult fields. There was a significant linear increase in the number of publications over the study period in pediatric ($R\text{-Sq} = 87.7\%$; $p < 0.0001$) and adult ($R\text{-Sq} = 96.4\%$; $p < 0.0001$) urology publications. When we considered the various categories of publications, there was a steady increase over time in both adult and pediatric articles categorized as clinical trials ($R\text{-Sq} = 32.14\%$; $p = 0.028$ and $R\text{-Sq} = 77.7\%$; $p < 0.0001$, respectively). However the pediatric clinical trial publications decreased in 2001 and 2002 with a subsequent increase in the following years. There was a similar increase in adult and pediatric articles categorized as RCT ($R\text{-Sq} = 92.5\%$; $p < 0.0001$ and $R\text{-Sq} = 77.7\%$; $p <$

0.0001, respectively) and those categorized as editorial comments (R-Sq = 70.7%; $p < 0.0001$ and R-Sq = 43.9%; $p < 0.012$, respectively). Moreover, there was a significant increase in meta-analysis publications in adult and pediatric population (R-Sq = 90.3%; $p < 0.0001$ and R-Sq = 54.0%; $p = 0.002$, respectively). There was a significant increase in adult and pediatric articles categorized as 'letter to the editor' (R-Sq = 77.4%; $p < 0.001$ and R-Sq = 39.7%; $p = 0.002$, respectively). There was no significant increase in adult and pediatric articles categorized as 'practical guidelines' (R-Sq = 19.5%; $p = 0.100$ and R-Sq = 62.1%; $p = 0.957$, respectively). Although there was no significant increase in adult review publications (R-Sq = 23.4%; $p = 0.068$), the pediatric publication in this category demonstrated a steady increase (R-Sq = 75.6%; $p < 0.001$). Finally, the case publications category showed an overall increase in publications over the study period in both adult and children (R-Sq = 79.5%; $p < 0.001$ and R-Sq = 75.6%; $p < 0.001$).

Male versus Female Analyses

There was an increase in the number of publications in female and male urology over the study period. From 6,000 to 10,000 manuscripts were published in female urology (R-Sq = 93.2%; $p < 0.0001$) and from 6,000 to 13,000 in male urology (R-Sq = 95.5%; $p < 0.0001$), respectively (table 2). Thus, there was an overlap of 7,817 publications that involved female and male populations. There was a steady increase over time in both female and male articles in all categories. However also in the case publications category, in spite the overall increase of publications in both male and female manuscripts (R-Sq = 87.0%; $p < 0.0001$ and R-Sq = 90.5%; $p < 0.0001$, respectively), there has been a trend of a steady decrease in the number of case reports published in recent years.

Discussion

Our study confirms that there has been a continuous increase in the number of medical articles published in the fields of pediatric and adult urology in the last decade. More importantly, the yearly number of articles usually considered as representing the highest level of scientific evidence, such as clinical trials and RCT, had a disproportionally higher contribution to the yearly increase, while articles usually considered as representing lower levels of scientific evidence, such as case reports, reviews, or letters to the editor, had a much slower rate of increase or no significant increase at all over the years.

Moreover there was a sharp increase in the type of publication considered currently as the very highest level of evidence, i.e. meta-analyses in the pediatric urology articles. Thus, this finding is quite 'reassuring', since the quality of urological publications appears to be improving in a faster manner than their quantity [7, 8, 11]. However, we noted that case reports which are usually considered as presenting a low level of evidence, were still very popular, in spite of a relative decrease in the last 4 years in both pediatric and adult urology. It is speculated that the observed decrease in the number of low quality publications reflects the enormous efforts by many journals to curtail the number of case reports accepted for publication. Two of us serve as members of editorial boards of leading journals and have become witnesses of the policy of many journals to increase the number of high quality RCT at the expense of retrospective case series. It is widely believed that evidence-based clinical practice improves patient's care [1, 7], a concept well recognized by the urological community [8–10]. Furthermore, competence in critically appraisal skills is necessary to successfully implement an evidence based practice [2, 7, 9]. Educational support is crucial in evidence based clinical practice. The concept of a hierarchy of evidence represents one of the guiding principles of evidence based clinical practice. Ideally clinical decisions should be based on the highest level of evidence available. Unfortunately even RCT, which are considered as the top of the clinical evidence based medical literature, are not able to provide an answer to all types of clinical questions [10–13]. Several recent studies that highlighted significant methodological shortcomings of different urological publications also included RCT. However, to our knowledge no study to date has formally evaluated the trends in the urological publication in recent years.

Of course it is difficult to compare the increase in number of high quality publication in adult versus pediatric urology [14]. The trend in the number of RCT published in adult and pediatric publications is clear evidence of this difficulty. The number of RCT published in the adult field is almost 8 times higher than in the pediatric field. There are several possible explanations for this phenomenon: ethical difficulties, problems in recruiting patients for both arms of the trial and compliance with long follow-up when needed. Additionally, differential funding for adult and pediatric studies may also contribute to what we have observed.

Another striking finding of the present study was that the number of editorials, which usually are counted as low level of evidence, increased over the last 15 years.

This finding is hard to explain, and it appears that journal editors may feel necessary to support their decision to accept manuscripts for publication and often give editorial consultants a podium to express their opinions on an important topic.

For the practicing physician there is a considerable amount of research and clinical data to read and integrate. Evidence based medicine requires the translation of these data into critical evaluation, followed by synthesis, dissemination, and clinical application, which may at times be a daunting task [1].

The complexity of this task was emphasized recently by Sinclair [15] who pointed out that, since the introduction of the term 'evidence-based medicine' in Medline in 1992, the use of this term has dramatically increased in the medical literature. Furthermore, Moher et al. [16] published a CONSORT statement, on the criteria for randomized clinical study reporting, in order to endorse the quality of published manuscripts. Moreover the growth of the "Word Wide Web" is inevitable and with this the number of patients using the internet to gain information about their health and different approaches to their medical conditions will also increase [3]. Reliable medical publications with a high level of evidence will help to educate our patients and to decrease the risk of surfing into the world of misleading information.

The analysis of the publications in the male and female categories further iron out the findings of our study demonstrating an overall increased number of publications in both categories. Although in some categories such as practical guidelines the numbers of female articles are higher than in the male category, the general tendency of the increase of high quality publication might be clearly seen from our results. Also here we may see an apparent decrease of the "low quality" publications such as case reports over the last years.

This study is not without limitations. We have divided and tagged studied data automatically by PubMed, and thus it might not be 100% accurate. This applies both to the age category (pediatric or adult) and also to the type of study. Misclassification errors are possible. However, a random sample of the retrieved articles revealed an excellent degree of agreement with the PubMed categorization. Additionally, we do not claim that the keywords we used allowed us to access all articles published in the field of urology. Using additional keywords may have helped us retrieve more articles. In addition, we cannot be confident that all articles written in the field of urology are recorded in Medline. Thus, our study is not a study of all urology articles. It is a study of all urological publica-

tions recorded in Medline using the keywords that we searched for. However, we do not believe that accessing those articles not in Medline would have significantly modified our findings and conclusions in view of the very large number of publications that we were able to retrieve using the above-mentioned keywords.

Conclusions

Over the past 15 years the fields of pediatric and adult urology have had a significant yearly increase in published original studies. Moreover, the number of high quality publications has shown a steady increase although not as the same tendency in adult and pediatric populations. Regardless, there is still a significant number of low level evidence published in the urological literature. We trust that the current requirements toward evidence-based medicine will impact future research and publications in the field of pediatric and adult urology.

References

- 1 Evidence-based Medicine Working Group: Evidence-based medicine. A new approach to teaching the practice of medicine. *JAMA* 1992;268:2420–2425.
- 2 Borawski KM, Norris RD, Fesperman SF, Vieweg J, Preminger GM, Dahm P: Levels of evidence in the urological literature. *J Urol* 2007;178:1429–1433.
- 3 Hellawell GO, Turner KJ, Le Monnier KJ, Brewster SF: Urology and the internet: an evaluation of internet use by urology patients and of information available on urological topics. *BJU Int* 2000;86:191–194.
- 4 Oelrich B, Peters R, Jung K: A bibliometric evaluation of publications in urological journals among European Union countries between 2000–2005. *Eur Urol* 2007;52:1238–1248.
- 5 Even-Or E, Jean Sichel Y, Perez R, Mimouni FB: Pediatric and adult otorhinolaryngological publications: trends over 15 years (1993–2007). *Int J Pediatr Otorhinolaryngol* 2009;73:1737–1741.
- 6 Mimouni D, Pavlovsky L, Akerman L, David M, Mimouni FB: Trends in dermatology publications over the past 15 years. *Am J Clin Dermatol* 2010;11:55–58.
- 7 Yank V, Barnes D: Consensus and contention regarding redundant publications in clinical research: cross-sectional survey of editors and authors. *J Med Ethics* 2003;29:109–114.
- 8 Turpen RM, Fesperman SF, Sultan S, Borawski KM, Norris RD, Klink J, Sur RL, Breau RH, Krupski TL, Dahm P: Levels of evidence ratings in the urological literature: an assessment of interobserver agreement. *BJU Int* 2010;105:602–606.
- 9 Tseng TY, Breau RH, Fesperman SF, Vieweg J, Dahm P: Evaluating the evidence: the methodological and reporting quality of comparative observational studies of surgical interventions in urological publications. *BJU Int* 2009;103:1026–1031.
- 10 Scales CD Jr; International Evidence-Based Urology Working Group: Education and training in evidence-based urology. *World J Urol* 2011;29:325–329.
- 11 Agha R, Cooper D, Muir G: The reporting quality of randomized controlled trials in surgery: a systematic review. *Int J Surg* 2007;5:413–422.
- 12 Patsopoulos NA, Analatos AA, Ioannidis JP: Relative citation impact of various study designs in the health sciences. *JAMA* 2005;293:2362–2366.
- 13 Breau RH, Gaboury I, Scales CD Jr, Fesperman SF, Watterson JD, Dahm P: Reporting of harm in randomized controlled trials published in the urological literature. *J Urol* 2010;183:1693–1697.
- 14 Welk B, Afshar K, MacNeily AE: Randomized controlled trials in pediatric urology: room for improvement. *J Urol* 2006;176:306–309.
- 15 Sinclair JC: Evidence-based therapy in neonatology: distilling the evidence and applying it in practice. *Acta Paediatr* 2004;93:1146–1152.
- 16 Moher D, Schulz KF, Altman D; CONSORT Group (Consolidated Standards of Reporting Trials): The CONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomized trials. *JAMA* 2001;285:1987–1991.