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RESEARCH ARTICLES

Predictors of Publication Productivity Among Hospital Pharmacists in France and Quebec

Joachim Lelièvre, DPharm candidate,[a] Jean-François Bussières, MSc, MBA, BPharm,[b] Denis Lebel, MSC, BPharm,[b] and Sonia Prot-Labarthe, DPharm, PhD[c]

[a]University Hospital Center Brest, Brest, France
[b]University Hospital Center Sainte-Justine, Quebec, Canada
[c]Hôpital Robert-Debré, Paris, France

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Objective. To describe publications by hospital pharmacists in France and Quebec and evaluate factors predictive of publication productivity.

Method. Variables related to scientific publication productivity were identified through a search of the literature and organized into 4 themes (ie, personal and professional characteristics, hospital activities, research and publishing activities, publication-related motivations and perceptions). A questionnaire was developed that included short-answer items and 58 multiple-choice questions to determine respondents' level of agreement with statements about their motivations and perceptions surrounding publishing.

Results. Four hundred twenty-two hospital pharmacists (218 respondents from France and 204 from Quebec) were recruited. Respondents from France were more prolific than those from Quebec, even when considering factors such as time worked and gender. Furthermore, the percentage of respondents working in a university health center was lower in France than Quebec (46% vs. 70%, $p = 0.001$), as was the percentage of respondents indicating a mastery of English (43% vs. 88%, $p = 0.001$).

Conclusion. Seven factors were predictive of the number of publications per respondent in France and Quebec: practicing hospital pharmacy in France, being male, having academic duties or a PhD, having participated in a clinical trial, having secured funding in one's own name for a research project, and allocating a greater number of hours per week to research.

Keywords: publication, pharmacists, hospital, France, Canada, scholarship, research

INTRODUCTION

Hospital pharmaceutical practice has undergone a number of significant changes over the course of the last 3 decades with the development and use of robots to dispense medications, the development of computerized order entry, the development of pharmaceutical care, and the decentralization of pharmacists working on inpatient and outpatient healthcare teams. The upgrading of pharmacy curricula with the increase in bachelor's and master's degree training programs and the participation of hospital pharmacists in research activities within the framework of clinical trials and as scientific collaborators also has contributed to these changes.[1-3]

Corresponding Author: Jean-François Bussières, 3175, chemin de la Côte-Sainte-Catherine, Montréal (Québec) H3T 1C5, Phone: (514) 345-4603, Fax: (514) 345-4820, Email: jf.bussieres@ssss.gouv.qc.ca

In the healthcare sector, professional practice is documented through the publication of articles in journals in Medline or other databases. Publishing is a structured activity that allows authors and readers to define and document the development of practice models and demonstrate their impact on various outcomes.[4-6]

There is little information in the literature regarding the scientific publishing productivity of pharmacists. In academia, Thompson and colleagues assessed the number of publications by pharmacy faculty members who taught in faculties of pharmacy, using journals included in the Science Citation Index[7] from 1976 to 1992. While the number of publications increased by 100% over this period, only 18% of professors who taught in colleges/schools of pharmacy published more than 1 article per year. Coleman and colleagues evaluated 1,896 articles by 2,374 professors published in the Web of Science from 2001 to 2003 and found that 2.1% of the professors were responsible for

30.6% of the publications, and only 4.9% of the pharmacy professors published more than 2 papers per year.[8]

Thompson and colleagues compared the publication record (2006-2007) of pharmacy professors who held a chair position.[9] The average number of publications per chair was 51.3 for the professors with a healthcare facility affiliation and 19.1 for those without ($p = 0.01$).

In terms of hospital practice, the number of articles published by pharmacists in 3 indexed journals (*N Eng J Med, JAMA, Ann Intern Med*) rose from 1 article in 1966 to 13 in 1976.[10] Touchette and colleagues compared the publishing productivity of hospital pharmacists based on indexed articles that focused on major clinical trials in 1993 (n = 8127) vs. 2003 (n = 8793). Whereas the median number of authors per article increased from 5 to 6, the total number of pharmacists among the authors increased by 29.2% from 191 (2.4%) in 1993 to 271 (3.1%) in 2003.[11] A 2005-2006 survey of Canadian hospital pharmacy practice found that the average number of articles published per pharmacy department was 7.1 in 2003-2004 compared to only 4.5 in 2005-2006.[12]

To our knowledge, there are no data comparing the publishing productivity of hospital pharmacists between France and Canada. Our professional experience with previous exchanges between France and Quebec led us to believe that French hospital pharmacists published more papers than their colleagues in Quebec. Within this context, our objective was to identify and compare the publishing productivity of hospital pharmacists in France and Quebec.

METHODS

All pharmacists in France and Quebec who worked in healthcare facilities were included, while all pharmacy residents, interns, and students, and pharmacists who worked in other settings (eg, retail pharmacies, industry, university) were excluded. Since there are approximately 5300[13] and 1300[14] pharmacists who work in healthcare facilities in France and Quebec, respectively, our objective was to obtain a response from at least 150 in each country (3% and 11%, respectively) as a convenience sample within the context of this initial exploratory study.

Based on our literature search, we identified the variables that relate to scientific publishing productivity and organized them into 4 themes (ie, personal and professional characteristics, hospital activities, participation in research and publishing activities, and publication-related motivations and perceptions). A 58-item questionnaire was developed that included mandatory (n = 40) and optional (n = 18) responses. The questionnaire included multiple-choice questions (n = 9) and short-answer questions that included space for additional comments (n = 14). A 4-level Likert scale was used (strongly agree, agree, disagree, and strongly disagree) to verify the respondents' level of agreement with the statements about their motivations and perceptions surrounding publishing. Before delivering the questionnaire, it was pretested by 4 hospital pharmacists in France and 4 in Quebec to evaluate the clarity of the statements and the time required to complete the questionnaire. The comments allowed us to refine our version of the questionnaire. In the survey introduction, we defined a piece of research as being any original work of scientific nature or related to pharmaceutical practice. In the same way, we defined a publication as any document that disseminated research findings to the public (eg, paper, oral communication, poster communication). We provided a few examples of research work that could lead to publication, such as a review of the literature, drug utilization review, case report, case-control study, cohort study, randomized controlled trial, pharmacoeconomic analysis, development of an assay method, new galenic formulation, audit/evaluation of professional practice, and satisfaction survey instrument following a change in professional practice. The questions about pharmaceutical activities had to be expressed as a percentage of the annual activity.

The questionnaire was published on SurveyMonkey (www.SurveyMonkey.com, SurveyMonkey, Portland, Oregon) and accessible from November 12, 2008, to January 10, 2009. The Association pour le Développement de l'Internet en Pharmacie (ADIPH) publication list with 1696 subscribers[15] and the Conseil National Hospitalier d'Information sur le Médicament (CNHIM) directory with 1878 hospital pharmacists were used to send an e-mail invitation to participate in the survey to French hospital pharmacists. In Quebec, profesionnals who work in public healthcare facilities are listed in a single address book through Lotus Notes software. An e-mail was sent to 59 directors of pharmacy departments based on the public list of hospitals with more than 50 acute care beds. They were asked to take part in the survey and forward the e-mail to their pharmacy staff. The e-mail invitation reiterated the study's objectives and methodology, sought free and informed consent, and provided a hyperlink to the online questionnaire. Two reminders were sent over the 6 weeks to those who did not respond to the initial e-mail. The project was accepted by the scientific research committee of the Réseau Mère-Enfant de la Francophonie (RMEF).

Data Analysis

The data collected using SurveyMonkey were exported to SPSS, version 17.0 (SPSS, Inc., Chicago, Ill). A p value < 0.05 was considered significant. The respondents from France and Quebec were compared in terms of their personal and professional (duties, practice setting, training, hospital activities) characteristics, their

research and publishing activities, and their motivations and perceptions surrounding scientific publishing. Next, the variables for which there was a significant difference between the hospital pharmacists who had ever published a manuscript in a Medline or non-indexed journal and the hospital pharmacists who had never published such a manuscript were identified. An ordinal logistic regression was used to model only the number of papers published in Medline-indexed journals. The selected categories were: no publication in a Medline-indexed journal, 1 to 5 publications in a Medline-indexed journal, and at least 6 publications in a Medline-indexed journal. Analyses of the level of agreement were conducted using 2 groups (agreement and disagreement). The strongly agree and agree responses were aggregated together as agree, and the strongly disagree and disagree responses were aggregated together as disagree. The continuous variables were compared using either the Student *t* test or Mann-Whitney test according to the normal or abnormal distribution of the variable. Chi-square tests were used to compare the categorical variables. The explanatory factors introduced in the model were the country of origin, gender, non-single status, number of children, university hospital center (UHC) work, having academic duties, supervising pharmacy students, having a PhD, seniority ($<$ 10 years, 10 to $<$ 20 years, 20 to 30 years, $>$ 30 years, in full-time years), having participated in a clinical trial, having obtained specific funding under one's own name, and the number of hours worked per week ($<$ 35 h, between 35 and 50 h and $>$ 50 h).

RESULTS

Four-hunred twenty-two hospital pharmacists (218 respondents from France and 204 from Quebec) participated in the survey. It was not possible for us to calculate a response rate given the indirect method used to contact the respondents. Of the 422 questionnaires, 152 from France and 172 from Quebec were usable. One hundred respondents did not indicate their number of publications so their responses were not used. Based on the number of hospital pharmacists in France (n = 5303) according to the Ordre des pharmaciens de France[14] and in Quebec (n = 1327) according to the Association des pharmaciens d'établissements de santé du Québec (APES),[15] our sample of usable responses represented 3% of all hospital pharmacists in France and 13% of all hospital pharmacists in Quebec.

Personal and Professional Characteristics

The personal and professional characteristics of the respondents are presented in Table 1. The only significant difference between the hospital pharmacists in the 2 countries was the higher proportion of males in France. There were several differences in professional characteristics between the respondents from France and Quebec, particularly in terms of their assignment to practice settings, the amount of time spent on 5 types of pharmaceutical activities, the amount of time worked each week, and certain aspects relating to training. Characteristics of excluded respondents were comparable to those of the included respondents.

Research Activities and Publication

The respondents from France published more than those from Quebec overall and in a broader range of publication types (Medline-indexed journals, other peer-reviewed and non peer-reviewed journals, oral communications, and posters). However, the number of manuscripts published in Medline-indexed journals and in other peer-reviewed journals was much higher for respondents from France than those from Quebec (101 vs 41, respectively, for manuscripts published in Medline-indexed journals, and 200 vs 56, respectively, for manuscripts published in other peer-reviewed journals). The maximum number of manuscripts published in non-peer reviewed journals was higher for respondents from Quebec than for those from France (200 vs 80 manuscripts, respectively). From a quantitative point of view, the median values per respondent for these categories of publications varied between 0 and 1 in both France and Quebec. The distribution of publication topics was similar to that of hospital activities and corresponded to the respective shares of pharmaceutical activities per country (eg, pharmaceuticals services: France, median 59 % [0-100%] vs. Quebec, median 0 % [0-100%], $p < 0.001$; pharmaceutical care: France, median 20 % [0-100%] vs. Quebec, median 90 % [0-100%], $p < 0.001$; management: France, median 2.5 % [0-50%] vs. Quebec, median 0% [interval - 0-100%], not significant; teaching: France, median 0 % [0-100%] vs Quebec 0 % [0-100%], not significant. A greater percentage of respondents from France included more than 5 authors on their published papers (16.4% in France vs. 9.2% in Quebec, $p < 0.001$). Percentages of papers written and submitted in French were not significantly different between the respondents from France and Quebec (62.4% $\pm$ 38.4% vs. 58.3% $\pm$ 41.8%, $p = 0.369$).

Respondents' Perceptions and Motivations

Table 2 presents the perceptions and motivations of the respondents from France and Quebec. Out of the 10 statements that we proposed, the level of agreement differed between the respondents from France and Quebec. The respondents from France considered to a higher extent that publishing was governed by competition between teams, obtaining tenure, and competition within a department. Similarly, a much higher proportion of

Table 1. Personal and Professional Situations of a Sample of Hospital Pharmacists in France and Quebec

Variables	France n (%)	Quebec n (%)	*P*
Demographic profile			
Males	150 (44)	172 (33)	0.039 [a]
Non-single status	139 (78)	170 (77)	0.786 [a]
Average number of children[f]	140	172	0.517 [b]
Hospital duties			
Department head	150 (13)	172 (12)	[d]
Hospital practitioner [e]	150 (41)		
Assistant specialist or generalist [e]	150 (21)	172 (83)	
Attaché (or other term) [e]	150 (6)		
Other	150 (19)	172 (5)	
Practice settings			
UHC	150 (46)	172 (70)	0.001 [a]
HC	150 (31)	172 (27)	
Private clinic	150 (5)	172 (0)	
Other	150 (18)	172 (3)	
Seniority in years[f]	142	167	0.366 [b]
Hospital activities			
Pharmaceutical services[f]	144	159	NA
Pharmaceutical care[f]	108	151	
Management[f]	130	118	
Teaching[f]	115	137	
Research[f]	97	98	
Hours of work per week			
< 35 hours	150 (7)	172 (16)	0.001 [a]
Between 35 and 40 hours	150 (23)	172 (41)	
> 40 hours	150 (70)	172 (42)	
Training			
Comfortable with english	150 (43)	172 (88)	0.001 [a]
External continuing education activities/year[f]	130	149	0.135 [c]
Bibliographical research on a regular basis	144 (79)	167 (92)	0.002 [a]
Critical analysis of the literature on a regular basis	140 (76)	169 (86)	0.028 [a]
Average number of papers read/year[f]	114	153	0.368 [c]
Comfortable with office software programs such as Word, Excel and PowerPoint	146 (90)	167 (68)	0.001 [a]
Comfortable with software programs such as MS Access	142 (44)	166 (22)	0.001 [a]
Comfortable with software programs for statistical analyses	140 (19)	166 (19)	1.000 [a]

Abbreviations: UHC = University Hospital Center; HC = Hospital Center.

[a] Determined by a chi-square test.

[b] Determined by a Student *t* test.

[c] Determined by a Mann-Whitney test.

[d] Comparison not carried out given the difference in regulations between the 2 countries.

[e] Certain job titles exist only in France and this differentiation is not made in Quebec.

[f] Average number of children of hospital pharmacists in France 1.3 ± 1.2 and Quebec 1.2 ± 1.2; seniority in years for France 14 ± 8 and Quebec 13 ± 8; pharmaceutical services for France 54 ± 25 and Quebec 30 ± 20; pharmaceutical care for France 12 ± 12 and Quebec 41 ± 21; management for France 28 ± 22 and Quebec 28 ± 33; teaching for France 8 ± 8 and Quebec 12 ± 11; research for France 7 ± 9 and Quebec 8 ± 11; external continuing education activities/year for France 3 [2-5] (med [Q1-Q3]) and Quebec 3 [2-6]; average number of papers read/year for France 30 [12-60] and Quebec 30 [20-50].

Table 2. Hospital Pharmacists Who Agreed With Statements on Personal Perceptions and Motivations Surrounding Publishing, %

Statements	France[a]	Quebec[b]	*P*[c]
Statements on publishing			
Publishing is governed by competition between teams	54	31	0.001
Publishing is governed through tenure	69	40	0.001
Publishing is governed by the department's competitive environment	81	53	0.001
Publishing is governed by scientific progress	73	90	0.001
The most important authors are always the first three authors	80	79	0.784
Department heads must always appear last after the other authors of an article	63	15	0.001
Department heads must always be listed among the authors even if they have not significantly contributed to the work done.	63	6	0.001
Authors must always be ranked according to the significance of their share in the project beginning with the most important and ending with the least important.	89	86	0.412
Other department members who need to build up their list of publications quickly may be added to the list of authors even if they were not directly or significantly involved in the project.	28	8	0.001
No more than ten authors may be listed for a single article.	87	58	0.001
Important publishing strategies[d]			
The method is of good quality	79	73	0.243
The authors complied with the recommendations of the journal's editors.	66	66	1.00
The quality of the paper is up to the journal's standards.	59	72	0.019
The findings are of good quality.	49	43	0.265
The abstract was previously accepted for an oral or poster presentation at a scientific meeting	15	13	0.630
The ethics review board validated the study.	12	17	0.210
One of the authors has already established contact with the editor (previous publications, reviewing other articles for the journal, previous collaboration).	8	10	0.197
One of the authors knows the editor.	4	1	0.053
One of the authors has contacted one of the members of the editorial board to obtain his opinion about the interest the journal may have in publishing the paper.	9	5	0.177
The act of publishing...			
Allows me to improve my knowledge in a field or to innovate	92	94	0.666
Provides me with a challenge	87	93	0.091
Gives me the opportunity of putting my personal skills and abilities to use	85	91	0.083
Gives me the opportunity of being useful to others	82	88	0.116
Allows me to help certain individuals, groups, organizations or society	72	90	<0.001
Allows me to be creative	75	79	0.356
Provides me with the opportunity of working as part of a team	81	67	0.005
Allows me to meet an academic/university objective	63	69	0.346
Provides me with the opportunity of exercising leadership	26	68	<0.001
Provides me with a certain level of social status and prestige	39	55	0.007
Allows me to go about my activities freely and without supervision	19	40	<0.001
Publishing allows me to earn money or access funding	17	28	0.017
Allows me to think about a stable and serene future	15	10	0.175

[a] n = 150
[b] n = 172
[c] Determined by a Chi-square test
[d] The respondents were asked to identify a maximum of 3 important strategies.

respondents from France considered that department heads should be cited last among an article's authors and that they could appear among the list of authors without having made any significant contribution to the article. In terms of the strategies that could influence publishing, the respondents prioritized 3 of the 9 strategies proposed: the quality of the method, compliance with the author's recommendations, and consistency between the paper and the journal. No differences were noted between the respondents from France and Quebec.

As far as the motivations for publishing, the percentage in agreement exceeded 60% for 8 of the 13 statements included in the questionnaire. In addition, the level of agreement between the respondents from France and Quebec differed in 6 of the 13 motivation factors that were identified. More respondents from Quebec emphasized that the act of publishing gave them an opportunity to help certain individuals, groups, organizations, or society to exercise leadership, reach a certain level of social status and prestige, go about their activities freely and without supervision, and earn money or funding. On the other hand, more respondents from France considered that the act of publishing gave them an opportunity to work as part of a team.

Seventy respondents from France and 59 from Quebec indicated that they had never attempted to publish the results of a project and indicated 1 or more of the following reasons to justify not submitting their paper: insufficient sample size (40% of those from France vs. 54% of those from Quebec), inability to identify a potential journal (31% vs. 27%, respectively), presence of nonsignificant findings (29% vs. 17%), presence of findings similar to those already published (20% vs. 19%, respectively), refusal of an abstract submitted to a congress (11% vs. 3%, respectively), and misunderstanding among the authors (11% vs. 15%, respectively). Only the percentages of those who cited the presence of negative findings (11 % vs. 2 %) were significantly different between the 2 groups ($p = 0.039$).

Publishing and Nonpublishing Predictors

From the literature review, we identified 28 predictors of publishing productivity (eg, demographic, professional, related to research activity, related to team dynamics and motivation)[16] and compared the presence of these factors among the respondents who had published at least 1 manuscript and the respondents who had never published (Table 3). We noted a significant difference between the respondents who had published (presence of the factor in a proportion that varied from 69% to 98%) and not published (presence of the factor in a proportion that varied from 36% to 78%) for 18 of the 28 predictive factors and an absolute variance of at least 20% for 5 professional factors and 5 factors related to team dynamics and motivation.

A multivariate ordinal logistic regression was conducted based on 290 questionnaires without any missing data (125 responses from France and 165 from Quebec) to model only the number of papers published in Medline-indexed journals. The selected categories were: no publication, 1 to 5 publications, and at least 6 publications in a Medline-indexed journal. The model obtained improved the log-likelihood ($p < 0.0001$). The chi-square and deviance values revealed the quality of the model ($p = 0.986$ and 1.0, respectively). The coefficient of determination (R^2) varied between 0.24 and 0.43 according to the tests (Cox and Snell, Nagelkerke and McFadden). No interaction was noted between the variables "working in a UHC," "having academic duties," and "supervising students." We did not consider the interaction between location variable and the factors for which there was a significant difference between France and Quebec (participation in the conduct of a clinical trial, desire to publish in education, priority to publish). Table 4 highlights significant predictors of publishing such as working in France, being a male, having academic duties, having a PhD, having participated in a clinical trial, having obtained funding in one's own name, and the number of hours worked in a week. Being nonsingle, number of children, working in a university health center, supervising students, and number of years of experience were not significant predictors.

DISCUSSION

There is little data assessing scientific publication productivity by hospital pharmacists. This is the first study to our knowledge to compare the publication record of hospital pharmacists in France vs. Quebec. Our ordinal logisitic regression allowed us to identify 7 determining and significant factors influencing scientific publication: working in France, being male, having academic duties or a PhD, having participated in a clinical trial, having personally obtained funding for a research project, and being able to allocate a greater number of hours to research per week. Most of these factors also were noted by other authors. Kaplan et al and Barnett et al showed that males publish more than females.[17,18] Having tenure, having completed a doctorate, and having completed a fellowship program are predictive of scientific publishing.[19-22] An adequate period of time dedicated to publishing activities is an important predictive factor in scientific publishing.[17,20,22]

Our study found that a higher number of respondents from France had at least 1 publication in their name, whatever the type of publication evaluated. Nevertheless, there were several differences between respondents from France and Quebec. The percentage of male respondents was higher in France than in Quebec (44% vs. 33%, $p = 0.039$) as was the percentage of respondents working more than 40 hours per week (70% vs. 42%, $p = 0.001$). The ordinal logistic regression, however, showed that respondents from France authored more articles in indexed journals than those from Quebec, even when considering factors such as time worked and gender. Furthermore, the percentage of respondents working in a UHC was lower in France than in Quebec (46 vs. 70%, $p = 0.001$), as was the percentage of respondents who had indicated a mastery of English (43 vs. 88%, $p = 0.001$). We expected that UHC practice would be a contributing factor in scientific

Table 3. A Comparison of Publishing Predictors for Hospital Pharmacists in France and Quebec

Factors	No.	Percent of Respondents Who Publish	*P*[a]
Demographic factors			
France vs. Quebec	150 vs. 172	77 vs. 65	0.019
Males vs. females	122 vs. 200	76 vs. 68	0.102
Non-Single vs. single	240 vs. 69	71 vs. 68	0.654
Children vs. No children	190 vs. 122	72 vs. 69	0.613
Professional factors			
Academic duties vs. none	122 vs. 200	77 vs. 67	0.059
PhD vs. no PhD	37 vs. 285	89 vs. 68	0.007
Student supervision vs. none	244 vs. 78	75 vs. 59	0.010
UHC vs. non-UHC	138 vs. 184	85 vs. 60	<0.001
> 40 hrs/week vs. < 40 hrs	178 vs. 144	82 vs. 57	<0.001
> 10 years' experience vs. < 10	168 vs. 97	69 vs. 77	0.158
Mastery of English vs. non-mastery	215 vs. 107	74 vs. 60	0.091
Mastery of office software vs. non-mastery	246 vs. 67	74 vs. 63	0.094
Mastery of database software vs. non-mastery	98 vs. 210	83 vs. 66	0.003
Mastery of statistical software vs. non-mastery	59 vs. 247	95 vs. 66	<0.001
Participation in activities aimed at evaluating the drug circuit vs. non-participation	223 vs. 99	72 vs. 69	0.597
Participation in continuing education activities vs. non-participation	286 vs. 36	72 vs. 58	0.118
Factors related to participation in research and publishing activity			
Participation in research protocol writing vs. non-participation	159 vs. 163	82 vs. 60	<0.001
Participation in the conduct of a clinical trial vs. non-participation	161 vs. 161	82 vs. 60 [b]	<0.001
Originally > 1 clinical trial or not	85 vs. 134	81 vs. 78	0.611
Writing letters to the editor or not	40 vs. 282	98 vs. 67	<0.001
Participation in administrative activities related to a medical journal or non-participation	58 vs. 264	98 vs. 65	<0.001
Factors related to team dynamics and motivation for publishing			
Desire to publish in education or not	191 vs. 131	79 vs. 60 [b]	<0.001
Priority to publish or not	98 vs. 224	90 vs. 63 [b]	<0.001
Encouragement for publishing in the department or not	151 vs. 171	81 vs. 62	<0.001
Recourse to a translator or not	75 vs. 247	89 vs. 65	<0.001
Funding for research projects or not	54 vs. 268	91 vs. 67	<0.001
Systematic submission of research projects or not	59 vs. 263	95 vs. 65	<0.001
Systematic resubmission of refused papers and communications or not	72 vs. 250	85 vs. 36	<0.001

[a] Determined by a chi-square test.
[b] There is a significant difference between the respondents from France who published and those from Quebec who published (chi-square).

publishing. However, as scientific publishing seems to be more related to the country of practice than the practice setting, the higher percentage of respondents from Quebec who worked in a UHC did not allow us to verify this hypothesis.

By evaluating the perceptions and motivations of hospital respondents from France and Quebec, we noted several differences that might help to explain this culture of publishing among respondents from France. For example, a higher percentage of respondents from France claimed that publication was governed by competition between teams (54% vs. 31%, $p = 0.001$), having tenure (69 vs. 40%, $p = 0.001$), or even competition within a department (81% vs. 53%, $p = 0.001$). In addition, most of the respondents from France accepted that pharmacy department heads should be listed among the authors even if they did not contribute in a significant way to the work carried out (63 vs. 6%, $p = 0.001$). They also believed that members of the department who needed to quickly establish a list of publications should be added to the authors of the paper, even if they did not directly or significantly participate in the project (28% vs. 8%, $p = 0.001$). Also, we know that the duration of hospital internship is longer in France than in Quebec (4 years vs. 16 months). Although we could not

Table 4. Multivariate Analysis of Predictors of Publishing

Predictors	Odds Ratio	*p*
Predictors of Publishing		
Working in France versus Québec	3.52	< 0.001
Male versus female	1.88	0.027
Having academic duties versus not	2.14	0.027
Having a PhD versus not	3.92	0.005
Having participated in a clinical trial versus not	2.33	0.003
Having obtained funding in one's own name versus not	3.07	0.003
Number of hours of work in a week		
Less than 35 hours versus more than 50 hours	0.18	0.004
35 to 50 hours versus more than 50 hours	0.30	0.003
Non-Predictors of Publishing		
Non-Single versus single	1.26	0.5
Number of Children		
No child versus 4 children	0.74	0.72
1 child versus 4 children	0.79	0.79
2 children versus 4 children	1.05	0.95
3 children versus 4 children	0.90	0.91
Working in a UHC versus not	1.39	0.23
Supervising Students versus not	1.50	0.24
Number of Years Worked		
Less than 10 years versus more than 30 years	0.47	0.29
10 to 20 years versus more than 30 years	0.59	0.46
20 to 30 years versus more than 30 years	0.49	0.35

Multivariate ordinal logistic regression was conducted to model only the number of papers published in Medline-indexed journals according to the following selected categories: no publication in a Medline-indexed journal, one to five publications in a Medline-indexed journal and at least six publications in a Medline-indexed journal.

compare the pharmacy curricula and publication objectives of these graduate programs, it is reasonable to think that a longer internship could contribute to scientific publishing, both through the student's labor within the program and through increased exposure to academic activities before beginning autonomous hospital practice. We learned that the reform of the healthcare system, the ISA point system, and the grouping in axes in France are potential positive factors for scientific publishing. In addition, the Système d'Interrogation, de Gestion et d'Analyse des Publications Scientifiques (SIGAPS) project in France is aimed at trying to help healthcare facilities compile their employees' Medline publications.[23] All new employees bring to their new facility the benefit of their past publications. The SIGAPS project is involved in making funding decisions for the facility's education, research, referencing, and innovation missions.

Paradoxically, we noted an equal or lower percentage of respondents from France for all the statements surrounding motivations for publishing. With the exception of teamwork (81% vs. 67%, $p = 0.005$), the respondents from France did not feel that publishing allowed them to be creative, to exercise leadership, to have a certain social status or prestige, etc, to the same extent as respondents from Quebec. Thus, it appears to us that scientific publishing is a key activity that may affect the promotion of hospital pharmacists in France more than it affects those in Quebec, and that scientific publishing is more influenced by competition and promotion than by other professional motivations. This can be explained in particular by the differences in entrylevel permanent positions in France vs. Quebec and by the number of hospital pharmacists. Quebec is faced with a long-term shortage of pharmacists, and graduates may often obtain a pharmacist position as soon as they graduate from their residency program. In contrast, pharmacists in France must still take a competitive examination after their internship. Passing the competitive examination is conditional upon, among other things, the publication of scientific articles and work activities. Therefore, the difference in the employment process (eg, completing a competitive examination post internship in France) can explain why French pharmacists have higher publication rates than their counterparts in Quebec. Obtaining a stable position is only possible after passing the examination and spending several years working on fixed-term contracts.

Pharmacy practice has experienced unprecedented growth over the last few years. Hospital pharmacists are called on to contribute more than ever to scientific publishing in both clinical research on medications and evaluative research on modes of healthcare intervention including pharmaceutical practice. For example, the American College of Clinical Pharmacy published a white paper on the training required for research pharmacists.[24] It also published several statements about the importance of hospital pharmacists taking part in research, both in clinical practice[25] and at the level of pharmaceutical practice.[26] Not surprisingly, exposure to structured research work is predictive of scientific publishing.

This study has certain limitations. First, we studied a convenience sample that was not representative of the population of hospital pharmacists and we therefore cannot generalize our findings to the 2 populations as a whole. We also had a selection bias given that the ratio of males to females was not representative of hospital pharmacists in

France and Quebec. In fact, the ratio of females who practice hospital pharmacy is higher. In France, the way to enter a permanent position is a tenure-track system with emphasis, among other things, on publications. In Quebec, this is not the case and junior pharmacists can easily find permanent position after their residency. This fact alone may explain the higher rate of publication among respondents from France than from Quebec. Finally, the chi-square test does not allow us to highlight a causality link between certain factors and scientific publishing. To do this, further studies on a larger scale are required. The fact that pharmacists in Quebec took part in the survey at the request of their pharmacy department heads may indicate a better mode of recruitment than an invitation delivered solely through mailing lists, as was done in France.

CONCLUSION

This study evaluated the predictors of publishing among hospital pharmacists in France and Quebec and highlighted 7 predictive factors: practicing hospital pharmacy in France, being male, having academic duties or a PhD, having participated in a clinical trial, having secured funding in one's own name for a research project, and the number of hours of work in a week. Although the study was unable to verify the content of academic education and training at the bachelor's and master's levels in France[27] and Quebec[28] that would contribute to publishing, we think that pharmacy curricula must include more structured training on various aspects of scientific publishing. In addition, active participation of pharmacists in conducting research and writing papers is essential.[29]

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