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ORIGINAL ARTICLE

Investigation of student views on industrial pharmacy

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Abstract
Aims: To identify the key reasons why few pharmacy students opt for a career in the pharmaceutical industry.
Methods: A 17 item questionnaire was developed and distributed to final year undergraduates in UK schools of pharmacy. Respondents gave views on possible career choices using structured and open questions and a five point Likert scale.
Results: Questionnaires were returned from 219 final year pharmacy undergraduates. Seventy-one students expressed an interest in industrial pharmacy. Key attractions of the industry included a wide range of job opportunities and a research environment; key detractors included lack of patient contact and a perception that work would be dull, difficult and laboratory based.
Conclusion: Undergraduates do not have enough information concerning industrial pharmacy to be able to make informed judgements concerning opportunities in this sector.

Keywords: *Careers, industrial pharmacy, pharmaceutical industry, pharmacy students*

Introduction

There are many reasons why students may choose to undertake a pharmacy degree. Some students have a family background in pharmacy. Others may have chosen pharmacy because chemistry was their best subject at school and pharmacy appeared to offer a professional qualification with better job prospects than chemistry. There are also some students for whom pharmacy is a second choice, having been unable to obtain a place at medical school (Full-time workers, 2004). In an analysis of Universities and Colleges Admissions Service (UCAS) application form statements, the liking for science and/or desire to research/develop drugs (71%) were placed above the desire to help people (47%) (Hatfield, Langley, Jesson, & Wilson, 2004). Whatever the reason, it is likely that students arriving to undertake a pharmacy degree will have a perception of pharmacy as a clinical profession undertaken in a community or hospital setting. They may not have any awareness of career opportunities in the pharmaceutical industry.

The curriculum for a degree in pharmacy is presented as a combination of the pharmaceutical sciences and clinical pharmacy practice and there is much debate concerning the need for pharmaceutical science to underpin clinical pharmacy (Florence, 2006; Brown, 2007). The emphasis on one aspect or the other varies from one school of pharmacy to another. Although the degree course was extended from three to four years in 1997, there are many topics to be covered, and this may preclude consideration of careers, and industrial pharmacy in particular, as part of the curriculum.

In addition, the availability of pre-registration work experience placements is likely to influence career choices, together with factors such as availability of graduate posts in different sectors, pay and career prospects.

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Students qualifying as pharmacists have a variety of career options open to them including community and primary care, hospital, industry, government and academic posts. Around 72% of employed pharmacists work in community pharmacy, 22% in hospital pharmacy, 8% in primary care and only 10% in other sectors (An overview, 2004).

Literature searching revealed no previous systematic research into student perceptions of industrial pharmacy. The purpose of this study was to investigate the views of undergraduates on career choices and to explore their perceptions of industrial pharmacy.

Method

A piloted questionnaire was sent to five UK schools of pharmacy who agreed to participate in the survey, for distribution to all final year pharmacy undergraduates. Responses were anonymous. A second distribution was impractical because of the number of schools involved and the protracted timescale necessary for collection of questionnaires from the first invitation.

Respondents' views on career choices were explored using a mixture of structured and open questions and attitudinal statements using a 5-point modified Likert scale ("no interest" to "great interest"). For analysis, ratings were banded into three categories: positive, negative and neutral/no view. Data were entered onto an Excel spreadsheet and analysed using descriptive statistics. The survey was conducted in the Autumn term 2004.

Results

The response rate was approximately 44% (219), and varied between schools (Table I). Students' ages ranged from 21 to 45 years, most students (90%, 198) being 25 years of age or under.

Students' career preferences before starting their degree course and in their final year are shown in Table II. The numbers of students with no interest in industrial pharmacy careers were 102 (47%) pre-degree and 91 (42%) in the final year. Although there was a slight trend away from industry during the four years of the undergraduate course, this change was not statistically significant ($\chi^2 = 2.554$, $p = 0.110$).

Although 85 (39%) students thought that industrial pharmacy might be a career choice worth exploring, 169 (77%) wanted a career which would provide direct contact with patients, with greatest interest in provision of medicines expertise and advice (202, 92%) and patient contact and clinical pharmacy (197, 90%), and least in pharmaceutical science (62, 28%), laboratory research (43, 20%) and manufacture of medicines (36, 16%). Only 19 (9%) students had little interest in clinical pharmacy, whereas, 151 (69%) students had little interest in pharmaceutical science (Figure 1).

Although almost all students said they had studied some topics relevant to the pharmaceutical industry (Table III), only 65 (30%) students considered that a career in the industry would make good use of a pharmacist's expertise. However, 132 (60%) considered that the industry would provide good career development and promotion prospects. Seventy-four

Table I. Demographics and family pharmacist connections of respondents.

				Family connections	
Respondents	Male students number (%)	Female students number (%)	Total	Community number (%)	Total number (%)
School 1	19 (30)	45 (70)	64	16 (25)	24 (38)
School 2	22 (29)	53 (71)	75	16 (21)	28 (37)
School 3	2 (20)	8 (80)	10	0 (0)	0 (0)
School 4	19 (30)	45 (70)	64	14 (22)	18 (28)
School 5	0 (0)	6 (100)	6	0 (0)	1 (17)
Total	62 (28)	157(72)	219	46 (21)	71 (32)

Note: Percentage responses from individual schools unknown, since responses were returned anonymously.

Table II. Career preferences of respondents.

	Pre-degree course preferences number (%)		Final year preferences number (%)	
Respondents ($n = 219$)	Community and/or hospital	Industry	Community and/or hospital	Industry
School 1 (64)	60 (94)	26 (41)	46 (72)	21 (33)
School 2 (75)	65 (87)	26 (35)	56 (75)	13 (17)
School 3 (10)	9 (90)	7 (70)	9 (90)	2 (20)
School 4 (64)	56 (88)	15 (23)	50 (78)	10 (16)
School 5 (6)	6 (100)	2 (33)	6 (100)	0 (0)
Total (219)	196 (72)	76 (28)	167 (78)	46 (22)

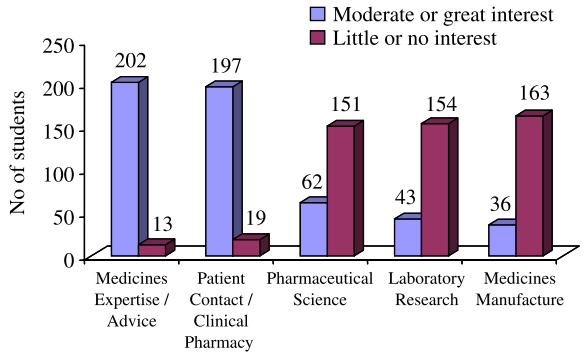

Figure 1. Expressions of interest in areas of a pharmacist's expertise. *Note*: Figures represent the number of students responding to these questions.

(34%) considered that a higher degree was necessary for entry into the industry.

Eighty-three (38%) students expressed an interest in learning more about the role of the pharmacist in the industry, and 43 (20%) were interested in learning more about regulatory affairs.

Analysis of responses to open questions identified four major themes that related to lack of interest in industrial pharmacy and four major themes that related to reasons for having an interest in industry (Table IV).

Undergraduate course and pre-registration training

It was clear that students knew little about the industry, as typified by the following comment:

> We seem to have spent a lot of time in lectures on pharmaceutics but I still have no idea what an industrial pharmacist does on a day to day basis.

Choice of career

In responding to open questions concerning students' reasons for choice of career, students often highlighted their preference for clinical pharmacy, together with flexibility of location and the prospect of higher pay

Table III. Aspects of the pharmaceutical industry which had been studied by students during the undergraduate course.

Aspect	Number (%) ($n = 219$)	
Pharmaceutical development (formulation)	214	(98)
Quality assurance	210	(96)
Drug discovery/analytical development	209	(95)
Manufacture	203	(93)
Preclinical development (pharmacology/toxicology)	198	(90)
Clinical development (clinical trials)	183	(84)
Product information	168	(77)
Regulatory affairs	133	(61)
Sales and marketing	76	(35)
General management	58	(27)

Table IV. Main themes relating to reasons for interest or lack of interest in industrial pharmacy.

	Number of forms (%) ($n = 219$)	
Reasons for lack of interest in industrial pharmacy		
Desire for patient contact	33	(15)
Would find industry dull	13	(5.9)
Too hard	7	(3.2)
Dislike laboratory work	6	(2.7)
Reasons for interest in industrial pharmacy		
Interested in research	18	(8.2)
Wide range of career opportunities	16	(7.3)
Good pay	9	(4.1)
Enjoyed industrial work experience	6	(2.7)

(in community pharmacy), as typified by the following comment:

> Enjoy interaction with patients. Better money.

A further major factor was familiarity with community pharmacy: 16% (36) students had enjoyed work experience in the community sector, and 21% (46) had a close relative who worked in community pharmacy (Table I). This experience influenced students' views, as typified by the following comment:

> Worked in community pharmacy for a while and really enjoyed it.... my confidence developed.

Industrial pharmacy

Comments on industrial pharmacy were often negative and based on the misconception that all industrial pharmacy work entailed laboratory-based research, as typified by the following comment:

> Hatred of pharmaceutics. Enjoy working with people.

Some comments indicated enthusiasm for the industrial sector, as exemplified by the following comment:

> Good career prospects, promotion, salary, challenging.

However, other comments confirmed that students had little knowledge of industry, such as the following:

> Maybe a work placement might give us an insight into the area, practical application is the only way to know if one would like it.

Overall, students offered few informed comments about industrial pharmacy. Comments suggested that this was partly due to the low profile of industrial pharmacy and lack of job opportunities, as summed up in the following comment:

> I am doing hospital pre-reg and if I enjoy it I might stay in that sector. If I could get into industry I would definitely like to work in that sector but at uni we've had no indication of how to apply for jobs there.

Views of male and female students

The proportion of male to female students was 62:157 (28% male). Slightly fewer male students thought they might choose an industry career (14% compared with 24% females), but this difference was not statistically significant. Reasons given were particularly related to lack of interest in research, and significantly more male students considered that they would find industry dull ($\chi^2 = 6.064$, $p = 0.014$). Male and female students were equally keen to choose a career with patient contact.

Discussion

The investigation was designed to explore the views of pharmacy students on career options, with particular reference to industrial pharmacy. Five schools of pharmacy participated in the survey. These included schools based in old and new universities and located in different regions of England. A sample size of 219 (approximately 12% of UK final year pharmacy undergraduates) was achieved. No attempt was made to analyse results from individual schools separately, since sample sizes in individual schools varied greatly.

It was of interest to note that although the majority of students initially chose to study pharmacy because they were interested in pharmaceutical science, their views changed during the four or five year course, so that in their final year, more students were interested in clinical pharmacy than in pharmaceutical science, although this trend did not reach statistical significance.

Of particular concern were students' perceptions of the pharmaceutical industry. It was apparent that they understood very little concerning the wide range of career opportunities available to pharmacists in the industry. Hence, they were unable to make informed decisions concerning potential industrial careers.

A further concern was the perception of many students that pharmaceutical science was difficult and of little interest. This view has relevance to all aspects of pharmacy practice; many hold the view that it is only the sound scientific basis that delineates pharmacy from other health professions and enables pharmacists to meet the often quoted definition of a pharmacist as the expert on medicines (Buckton, 2003; Anderson, 2005).

In spite of these findings, more than a third of students expressed an interest in learning more about the role of the pharmacist in the industry. Amongst the minority that had some practical experience of work in the industry, opinions regarding the possibility of opting for an industry career were positive.

Approximately one third of respondents thought they might be interested in a career in industrial pharmacy. This contrasts with the findings of Wilson, Jesson, Langley, Hatfield, and Clarke (2006), who found that about 12% of final year students were interested in industry, and with the findings of a survey by the British Pharmaceutical Students' Association (BPSA) which indicated that 18% of students were interested in a career in the pharmaceutical industry (Industrial Pharmacist, 2006). In view of the proportion of pharmacists in the industrial sector (3.8%) (An overview, 2004) it is perhaps surprising that 14% of male students and 24% of female students stated that they were considering choosing a career in industrial pharmacy. The fact that the actual proportion of pharmacists in industry is much lower suggests that factors such as non-availability of industrial pre-registration placements may have a substantial influence on loss of young pharmacists to the industrial sector.

Since this was an exploratory investigation, the overall sample size was considered adequate to give a general indication of many students' views. Nevertheless, results may not be fully representative, since views of non-respondents may be more negative and different schools of pharmacy place different emphasis on clinical and scientific content of the curriculum, with varying exposure to industrial pharmacy.

The results confirmed that most students considered patient contact to be a very important factor when choosing a career; two thirds of students were considering careers in community or hospital pharmacy, compared with one fifth of students considering industrial pharmacy. Many students considered that industrial jobs would be laboratory based, difficult and dull. It was clear that most students had very little understanding of the wide range of job opportunities in the industry, and appeared to have too little information to be able to make informed decisions.

In a separate, but complementary study to this, information available to students was investigated in a survey sent to UK schools of pharmacy careers advisers. Ten of eleven schools who responded said they provided specific information on industry careers, including talks by outside speakers (9), leaflets (2), internal web information (1), a two hour seminar (1), a careers fair (1). One school provided teaching on the role of the pharmacist in various sectors, including industry. Careers advisers commented on the lack of pre-registration industry posts (4), resulting in a general trend away from student interest in industrial pharmacy. The results of this survey indicated that the extent and type of careers advice available to students differed between schools and that students did not have equal access to relevant information and experience.

The surveys of careers advisers and students provide some insight into the industry from the schools of pharmacy perspective. It is relevant also to consider initiatives taken by industry and by industrial pharmacists, particularly in relation to recruitment. The Industrial Pharmacists' Group (IPG) considers

that recruitment of high quality undergraduates is important. The IPG has a team leader for visits to schools of pharmacy attached to each school, although evidence obtained from careers advisers and students suggested that visits were not made to all schools. It may be that visits were taking place, but that publicity was not adequate to ensure that all students and careers advisers were aware of these visits.

The production of an IPG CD-ROM on drug development is a welcome step forward as a tool for increasing students' understanding of the industrial sector (Industrial Pharmacist, 2007). However, the success of this initiative will depend largely on the enthusiasm with which this tool is utilised within schools of pharmacy. Other activities of the IPG include liaising with the BPSA and encouraging the industry to provide more work placements and pre-registration places.

In the current programme of research, views have been sought from industrial pharmacists in addition to careers advisers and students. The views of industrial pharmacists are published elsewhere (Kirby-Smith, Portlock, & Brown, 2006). This allows for triangulation.

It has been somewhat discouraging to learn that many students feel that a career in the pharmaceutical industry would be laboratory based, boring and difficult and would require a higher qualification. This view is in contrast to those of industrial pharmacists, which revealed that a substantial proportion of pharmacists worked in regulatory affairs, management and/or quality assurance, and that pharmacists were very enthusiastic about their role in the industry. In spite of students' generally negative views, some students were keen to develop careers in the industry, and many students were interested in finding out more about industrial opportunities, with 22% of students considering a career in the pharmaceutical industry. The negative views expressed by other students were not helped by widespread ignorance or misconceptions about the pharmaceutical industry and what it might offer. On the other hand, some industrialists felt that the bright students they wished to attract would find their way into the industry regardless of whether or not there was an easy path.

It was clear that opportunities for work placements and pre-registration training in the industry were very limited, with no central organisation available for processing applications. In relation to hospital pharmacy, it has been found that the greatest influence on career choices of pharmacy undergraduates is work experience (Joshua & Fleming, 2002). This underlines the need to ensure that students are adequately informed about industrial pharmacy practice in addition to clinical practice, in order to equip them adequately to be able to make informed decisions concerning choice of career path.

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References

An overview of the main findings from the 2003 pharmacy workforce census [report] (2004). *Pharmaceutical Journal*, *272*, 750–751.

Anderson, S. (Ed.) (2005). *Making medicines*. London: Pharmaceutical Press.

Brown, M. R. W. (2007). Living with change: Research-based scientific education is essential. *Pharmaceutical Journal*, *278*, 425–426.

Buckton, G. (2003). The nation's experts on medicines. *Pharmaceutical Journal*, *271*, 377–379.

Florence, A. (2006). Baby clothes, sandwiches and T-shirts spoil pharmacy's professional image. *Pharmaceutical Journal*, *277*, 516–517.

Full-time workers make up less than half the register [meeting report] (2004). *Pharmaceutical Journal*, *273*, 625–626.

Hatfield, K., Langley, C. A., Jesson, J. K., & Wilson, K. A. (2004). Why apply to study pharmacy? An analysis of UCAS applications to an MPharm degree course. *International Journal of Pharmacy Practice* [supplement], R19.

Industrial pharmacist [foreword] (2006). Industrial Pharmacists' Group newsletter Feb; S1. *Pharmaceutical Journal*, *276*, 7389.

Industrial pharmacist [foreword] (2007). Industrial Pharmacists' Group newsletter May; S1. *Pharmaceutical Journal*, *278*, 7450.

Joshua, A., & Fleming, G. (2002). A learning opportunity for pharmacy students. *Pharmaceutical Journal*, *269*, 106–108.

Kirby-Smith, J. P., Portlock, J. C., & Brown, D. (2006). Careers in industrial pharmacy practice: An investigation of pharmacist roles in the pharmaceutical industry. *International Journal of Pharmacy Practice* [supplement], B56.

Wilson, K., Jesson, J., Langley, C., Hatfield, K., & Clarke, L. (2006). Pharmacy undergraduate students: Career choices and expectations across a four-year degree programme. Royal Pharmaceutical Society of Great Britain.