Physicians in the pharmaceutical industry: their roles, motivations, and perspectives

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Although physicians occupy a significant number of key positions in the pharmaceutical industry, practicing clinicians are often unaware of the variety of career paths within this industry, or of the structure of a pharmaceutical company. Here, we address questions that practicing clinicians frequently ask their colleagues in the pharmaceutical industry. In addition to providing an overview of the common roles occupied by physicians in pharma, we also describe the various motivations for transitioning into the industry and discuss different scenarios regarding the timing of the career change. Furthermore, we outline the characteristics and skills that enable physicians to have a successful career in pharma.

Introduction

Most medical graduates choose a career in patient care or academic research. According to a survey conducted by the American Society of Clinical Oncology (ASCO) in 2007, only 1% of hematology/oncology fellowship graduates took up a position in industry [1]. During their education, medical students often have limited exposure to the many opportunities available outside of patient care [2]. Here, we answer some of the questions practicing physicians might have for their colleagues in the pharmaceutical industry. In addition, we discuss the structure of a pharmaceutical company, the different roles taken by physicians in pharma, and the differences between working in clinical medicine and the industry.

In January 2019, we performed a search in PubMed, using search terms such as physician*, medic*, career*, [pharmaceutical AND (industry OR compan* OR firm)], or pharmaceutic* and MeSH terms, such as 'drug industry', 'physicians', and 'career choice'. In addition, we performed a pragmatic search of the gray literature, reviewing conference proceedings, websites, and bibliographies. We only considered English and German language sources published over the past 20 years.

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Structure of a pharmaceutical company

Pharmaceutical companies usually comprise two major entities: the research and development (R&D) and commercial organizations. Together, these two entities respond to corporate strategy as well as being part of developing that strategy. R&D describes the process that takes a molecule from discovery through to clinical development, regulatory approval, and often postapproval monitoring. It can be divided into preclinical research, which is mainly lab based, early development (phase I trials and proof-of-concept studies [3]) as well as late-stage development (phase III and IV trials). R&D usually includes drug and target discovery units and a large clinical development group that works on the design and conduct of clinical trials. An important additional function, often run in collaboration with commercial entities, is activities related to new business development and external innovation, whereby new discoveries or scientific platforms are licensed in from outside companies or academia. Clinical R&D is the engine that fuels almost every activity within a pharmaceutical company. The

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results from clinical trials are the basis for the approval of a drug, its seamless reimbursement, and subsequent commercial and promotional activities [3,4].

The commercial organization may include departments for medical and scientific affairs, market access (Box 1), marketing, sales as well as other supporting functions. Boundaries between departments as well as between the R&D and commercial organizations can sometimes blur, and cross-functional teams are common, especially in large pharmaceutical companies [5,6]. The primary role of the commercial organization is to manage the commercialization of a medicine throughout its life cycle. During the early stages of the development of a drug, the commercial teams contribute to the evaluation of potential indications as well as the definition of product attributes that inform the value proposition of a product. Once a product has been selected for clinical development, the commercial organization works closely with the clinical development team to optimize the development program and, consequently, to maximize the medical and commercial benefit of the product when bringing it to market. This is done by analyzing information gathered from horizon-scanning activities, such as evaluating the medical needs in different regions, understanding patient pathways, and assessing the reimbursement landscape [7]. Market research and scientific advice from governmental health technology assessment (HTA) entities can be used to inform specific evidence generation plans.

During the late clinical development phase, the commercial organization prepares the company for the product launch. Prelaunch activities include the set-up of local and regional medical, market access, and marketing teams as well as the design and implementation of a sales force structure. Post launch, the commercial teams communicate the benefits and risks of a product and educate healthcare professionals (HCPs) on the safe use of a product. The marketing and sales departments conduct market research, analyze the sales performance of a product, and oversee promotional sales activities. These insights can then be used by R&D to assess new indications and potential label extensions, often as part of a life-cycle strategy [8].

Additional structures outside of the two main entities exist. These include manufacturing and distribution, as well as departments such as legal, human resources, finance, and administration. Most entities tend to operate on three levels: global, regional, and national; with global teams developing the overall strategy, regional teams (e.g., Europe, North America, Latin America, and Asia-Pacific) forming a bridge between global and national teams, and national teams acting as the customer-facing operating companies that market and distribute medications and engage with relevant local experts, organizations, and health authorities, and address market access questions in the respective countries.

BOX 1

Market access

Market access refers to the process by which a company gets a drug to market and is reimbursed by either private payers and/or health insurance companies or governmentally funded centralized healthcare systems. In an increasing number of countries, reimbursement decisions require proof that additional costs for therapies are justified by additional benefits for patients and the respective healthcare system. The clinical and cost effectiveness of new medications has to be demonstrated and the economic budget impact on the healthcare system has to be predicted. Market access teams produce reports, often called HTAs, which contain health economic models comparing the new intervention with an existing standard of care. These reports support reimbursement decision-making and, ultimately, timely patient access to new therapies [24].

Roles of physicians within a pharmaceutical company

The exact number of physicians in the pharmaceutical industry is difficult to ascertain. In 2013, there was an estimated 2000 pharmaceutical physicians in the UK [7]. A similar number was reported for Germany in 2000, amounting to merely 0.7% of the total number of physicians in the workforce at the time [9,10]. Roles and backgrounds of physicians employed in pharma can vary depending on the size, therapeutic focus, and commitment to research of a company, as well as country-specific regulations or market trends [4]. Physicians working for smaller biotech companies, which often employ 50–100 people and focus on one or two disease areas, might have to fulfill multiple roles of R&D, medical affairs, and pharmacovigilance simultaneously. By contrast, those working for a large pharmaceutical company often have extensive responsibilities within a clearly defined position. Consequently, physicians have a multitude of options to choose from Refs. [6–8,11–14]. Physicians typically enter pharmaceutical companies in two ways: either as medical experts in the medical affairs department or as project physicians and/or study-responsible physicians in the R&D department.

Medical and scientific affairs

Job titles and job descriptions within medical and scientific affairs can differ across companies. Titles such as medical advisor, medical information manager, or medical scientific liaison are commonly used, and positions will involve several, or all of, the activities described here [6–8]. Physicians in medical affairs devise and implement the overall medical strategy by understanding where medicines might provide patients with the most benefit and developing plans to address data gaps and generate meaningful evidence. The deep scientific and medical understanding of a disease and its biology is a prerequisite for the early identification of potential future changes in the management of that disease. These insights are crucial for continued medical innovation and drug development, informing relevant business functions such as R&D to adapt their data generation and communication strategies accordingly.

Physicians in medical affairs develop scientific communication strategies and establish educational platforms to translate novel clinical data into practice. They ensure that disseminated materials on medicines or technologies are factually accurate and in compliance with industry standards [e.g., Association of the British Pharmaceutical Industry (ABPI) Code of Practice [15]]. Materials can include slide presentations for educational meetings, scientific websites, summaries of key clinical manuscripts or clinical case studies, interactive conference booth materials or sales aids for pharmaceutical sales representatives [16]. The medical affairs department also provides R&D, marketing and other teams with scientific and medical expertise. It might also provide input towards clinical trial design, support clinical trial operations, assess local evidence needs, or lead on the in-house education of medical scientific liaisons (MSLs) or the sales force. Depending on the country or healthcare system, physicians in medical affairs might collaborate with their colleagues in health economics and market access on any HTA, pricing, or reimbursement issues that might arise.

In addition to their interaction with internal stakeholders, medical affairs lead the engagement with external stakeholders, such as key opinion leaders (KOLs), medical associations, and scientific experts, to learn about current and future medical practice as well as unmet medical needs, and to discuss study designs, published data, potential data gaps, and existing treatment guidelines. These interactions might take place in the form of 1:1 conversations, meetings, or advisory boards, and provide a pharmaceutical company with valuable insights into the scientific, medical, and healthcare policy issues important to their customers [17]. Furthermore, physicians in medical affairs may engage with patient associations to capture the patient voice and integrate it into the general strategy of a particular therapeutic area [4]. They also supervise early access or compassionate-use programs, whereby access to investigational drugs is granted outside of the clinical trial space and before the commercial launch of a drug [6]. Medical advisors might also function as study-responsible physicians, designing or conducting real-world evidence-generation studies or postmarketing clinical trials (phase IV) that support the safe and effective use of approved medications. The internal and external stakeholders of medical experts are summarized in Fig. 1.

Research and development

There is a variety of positions for physicians in R&D, and the choice might depend on their personal preferences as well as their research interests and experience [12]. In preclinical or translational research, they might be involved in the identification and investigation of new molecules, molecular entities, biomarkers, or drug targets as well as the testing of novel uses for an existing product or the evaluation of the safety and tolerability of a product in animal models. Previous experience in medicinal chemistry, in vivo testing, or pharmacology is often required for positions in preclinical research. As part of the early development phase, physicians might examine molecules or technologies in 'first-in-human' (Phase I) trials or dose-finding studies.

In clinical research, they might act as clinical leads or study responsible physicians in either proof-of-concept or confirmatory (Phase III) trials; formulating and executing an overall strategic plan for the clinical development of a product, designing the clinical trial, writing the trial protocol, and preparing trial reports as well as risk-benefit-assessments. Study physicians will interact with a variety of internal and external stakeholders, including clinical research associates, clinical pharmacologists, medical writers, statisticians, database managers, and members of multidisciplinary project teams [4,17]. Furthermore, physicians in R&D have to interact with regulatory agencies early on to discuss and gain support for a particular study design or a proposed development strategy. They might also become involved in external investigator-initiated studies, where they will interact with academic institutions and affiliated researchers.

Pharmacovigilance

Pharmacovigilance, also known as drug safety, is another field where physicians often have an important role. Here, adverse events during clinical trials or clinical practice are collected and monitored, and safety reports are interpreted, taking into account the patient's age, gender, comedications, or comorbidities. Safety signals are usually discussed within the global safety monitoring team (SMT), where subsequent actions might be derived and, if necessary, discussed with the health authorities. Actions are then implemented on a global level to improve the safe and adequate use of a medication and to ensure patient safety worldwide. Following on from an adverse event reporting, pharmacovigilance officers might communicate dose adjustments, treatment discontinuations, or potential label changes, such as warnings and precautions. Consequently, pharmacovigilance involves interactions with various stakeholders, such as study-responsible physicians, healthcare professionals, patients, or health authorities, as well as data scientists and statisticians [4,18].

Regulatory medicine

Physicians in the regulatory medicine department coordinate the production and submission of applications and supporting documents to regulatory agencies [4]. These include new drug applications (NDA), marketing authorization applications (MAA),

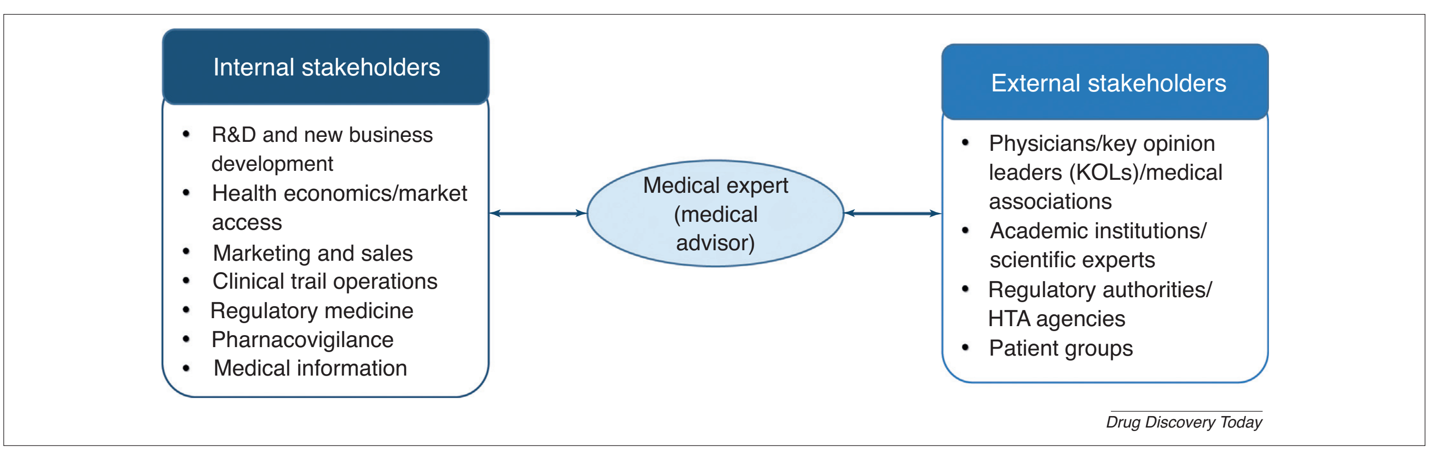

FIGURE 1
Internal and external stakeholders of physicians in medical affairs. Abbreviations: HTA, health technology assessments; R&D, research and development.

product labels, or variations, which are necessary to obtain or maintain marketing authorization for a product. Consequently, regulatory medicine involves the interaction with regulatory health authorities, such as the European Medicines Agency (EMA) or the US Food and Drug Administration (FDA) [8]. Within a company, the regulatory medicine department implements a variety of regulations, such as those regarding compliance with good clinical practice or good pharmacovigilance practice, and also provides strategic support for other departments [6]. Regulatory medicine can be an excellent career objective for those physicians who enjoy regulatory activity as part of their 'medical affairs' role.

Other roles and career paths

Positions in market access and commercial departments are often of a strategic nature and necessitate a considerable amount of nonmedical (e.g., health economic) knowledge and business acumen. Given that on-the-job training is usually required, these positions might represent part of a physician's career development, especially if a particular interest or talent is demonstrated. They can also be an entry-level opportunity, if the candidate has previously obtained an additional qualification in health economics or business administration [19]. If they have a strategic mindset and are versed in the complexity of care delivery, physicians can also act as commercial product managers, steering promotional efforts and helping to ensure that clinical data are appropriately translated into promotional claims. Finally, pharmaceutical physicians might also choose the career path of becoming independent consultants to the industry. These physicians tend to have many years of pharmaceutical industry experience and can offer an array of services in medical affairs, pharmacovigilance, or R&D. This career choice can offer flexibility to senior industry experts and an opportunity for companies with limited experience or resources in certain therapeutic areas.

Comparing industry and patient care

It is fair to say that working in the pharmaceutical industry is very different from working in individual patient care, and physicians contemplating a position in pharma should be aware that they might find the transitional period challenging.

However, there are a few similarities between pharma and patient care. The most striking similarity is that physicians in both fields are dedicated to improving the lives of patients [20]. In pharma, their extensive medical knowledge, acquired through their studies, clinical practice, and continuous medical education, still forms the basis for a successful career. Moreover, a physician's interest in scientific innovation and novel approaches has a significant role in developing the best therapies for patients. Physicians in the pharmaceutical industry continue to collaborate with experts in academia across different fields, for example as part of their involvement in clinical trials, and scientific rigor is highly valued [5]. Similar to their counterparts in clinical practice, pharmaceutical physicians usually have to provide proof of continuing medical education to maintain their medical licenses, as mandated by their national licensing authorities. In addition, they are often expected to take part in regular internal and external trainings, which might cover both disease-specific scientific developments as well as regulatory and legal topics.

One of the most notable differences between both fields is that direct patient contact is no longer part of the daily routine of physicians in the pharmaceutical industry. However, some companies offer options for physicians to practice clinical medicine part-time or fulfill their academic duties, such as giving lectures for medical students [5]. This approach might be particularly helpful for physicians during their transitional period. Whereas decisions are made on an individual patient level in patient care, physicians in the pharmaceutical industry contribute to the development of therapeutics for thousands of patients at a time, thereby having a medical impact on a larger scale [5]. Projects in pharma are often long-term efforts that allow for the extensive discussion of ideas or scientific concepts, whereas matters tend to be more case focused in patient care. In line with this, decisions in pharma might not have an immediate effect, and recognition of an individual's efforts might be different. Similarly, working in a pharmaceutical company is often more indirect than working in clinical practice. For example, when creating educational materials, the responsible person might not attend the meeting with the target audience.

In the pharmaceutical industry, physicians have frequent interactions with nonhealthcare professionals, such as colleagues from marketing or market access when collaborating in interdisciplinary teams, or with regulatory agencies when submitting a marketing authorization application [19]. Compared with clinical practice, working days are constructed differently and back-to-back meetings are common [13]. However, they are also more predictable and might involve less administrative work and documentation. Finally, as is the case with many other healthcare providers, the pharmaceutical industry is profit driven, with products having to be marketable and approvable [12]. Given that the costs of developing novel drugs are high with high attrition rates, commercial considerations need to be taken into account alongside safety and efficacy outcomes. Pharmaceutical research occurs in a highly competitive landscape, and grants and academic publications are no longer measures of success [20], but are replaced by various key performance indicators. Similarities and differences between working in industry and patient care are summarized in Box 2.

Motivations for a career change

Personal interests and strengths have a major role when considering a career in the pharmaceutical industry [13,21]. Hence, it is

BOX 2

Working in the pharmaceutical industry versus working in individual patient care*

Similarities

Commitment to improve lives of patients
Medical knowledge and continuous medical education
Collaborations with academics and experts across different fields
Scientific rigor as key to success

Differences

No direct patient contact
Medical impact on a larger scale
Projects as long-term efforts
Outputs more indirect
Frequent interactions with nonhealthcare professionals
Working days constructed differently

*Modified from [22].

difficult to provide a comprehensive list of possible reasons for a career change. Some doctors wish to design and conduct meaningful and robust clinical trials to improve both patient outcomes and their access to new drugs. They might find the pressures of combining practice and academia distracting and would prefer a more focused approach on research projects [20,22]. Others relish the prospect of daily international and crossfunctional collaborations as well as the numerous opportunities for personal and career development [4,7,13].

In certain cases, clinicians might find individual patient care challenging because of administrative pressures, healthcare policies, or reimbursement constraints. Others realize that there are no therapeutic options for certain patients, such as patients with rare or progressive diseases, and, therefore, hope to actively shape a therapeutic environment or advance medical innovation [20]. Some physicians might also appreciate the idea of positively influencing the care for thousands of patients instead of treating one patient at a time [5,7,21]. In addition to personal and scientific interests, financial considerations might also have a role when contemplating a career change. Pharmaceutical companies tend to offer competitive and performance-based salaries, but the relevance of this factor might vary widely between candidates, depending on country-specific or financial circumstances.

Timing of the career change

Although it is certainly possible to join a pharmaceutical company directly after university or academic research, it is generally advisable to work as a practicing physician for some time [7,8,12,17]. This will not only result in candidates having a better understanding of patient care and clinical practice, but will also aid them in acquiring extensive hands-on experience in a specific therapeutic area. In addition, candidates might have the opportunity to learn about and appreciate the design and conduct of safe and relevant clinical studies. The timing might also depend on the position of interest: If a career in preclinical R&D is desired, previous experience in laboratory research will prove advantageous, whereas clinical experience might be secondary. Conversely, prior specialization and clinical experience is crucial should a candidate wish to pursue a career as a therapeutic area expert [14].

Candidate characteristics

The main and arguably most valuable attribute of physicians in the pharmaceutical industry is their profound medical and scientific knowledge. This knowledge is key to them identifying unmet medical needs, giving sound medical advice to internal and external stakeholders, evaluating clinical studies and adverse events as well as interpreting complex clinical and scientific data [13,17,23].

Generally, physicians considering a career in pharma should have strong verbal and written communication skills, because these are essential for the interaction with internal and external stakeholders, as well as the production of publications, safety reports, or educational materials [4,11]. Given that the collaboration in cross-functional teams is fundamental to the success of a product and ultimately the company [21], candidates should be able to work in said teams. Leadership and decision-making skills, as well as business acumen, will prove beneficial during these group efforts.

Candidates should be willing to learn about new scientific concepts, corporate structures, business matters, and regulatory issues. They should be proactive, solution driven, and flexible, as well as able to stay on track in the face of a large project [17]. Furthermore, they should have a certain resilience, because competitive pressures, or safety and regulatory issues can sometimes get in the way of medical innovation [12,23]. They should also be aware that the short-term sense of achievement that doctors often experience in individual patient care will likely be missing. Depending on the role, candidates must be willing to travel, because frequent national and international business travel is to be expected [7].

Concluding remarks

Despite physicians occupying a significant number of key positions in the pharmaceutical industry, many doctors have not had significant exposure to pharma during their studies or clinical experience. It is necessary for the pharmaceutical industry to improve physicians' knowledge about the processes within pharmaceutical companies, not only to increase collaborative efforts between pharma and academia, but also to inform physicians considering a career in the pharmaceutical industry. Transitioning into pharma is a major career decision and can be challenging at times. However, the opportunity to develop innovative medicines, communicate their benefits, and, thus, influence the care of thousands of patients at a time is a rewarding alternative to individual patient care.

Conflicts of interest

This project was funded by Janssen-Cilag GmbH. All authors are employees of the pharmaceutical companies of Johnson & Johnson. The authors made all decisions relating to the concept, content, writing, and submission of the review. The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the pharmaceutical company with which the authors are affiliated.

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