

Rare diseases – a challenge for the medical world

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ABSTRACT

The diagnosis and treatment of rare diseases have improved significantly in recent years. The length of the diagnosis, which from the point of view of patients and their caregivers was considered the "Achilles' heel" of the healthcare system, has significantly shortened in many cases. Nevertheless, as research shows, there is still much to be done regarding the knowledge of rare diseases among healthcare professionals. The processes of diagnosis and treatment, as well as their organisation, should be redefined.

Rare diseases (RDs) have become a significant public health concern in recent years in many countries, with many previously ignored patients now becoming important. Many individuals and institutions are trying to support them in their everyday life, sometimes just to relieve their suffering. Public collections of money for expensive medical procedures often carried out in the best world centres have occurred. Moreover, such RDs are increasingly attracting media attention, highlighting the importance of caring for such patients [1]. There is no single definition of RDs. In the European Union, a rare disease is one that affects no more than 1 person in 2,000 [2].

The aim of the study is to review the current literature on the subject, in particular the latest

reports on the knowledge of students and healthcare professionals about RDs and the potential for changes in this area.

The public debate concerns both healthcare specialists participating in the diagnosis of RDs and diagnostic procedures used for patients with non-standard symptoms. Of course, the treatment process after the diagnosis of a specific disease is equally crucial, which raises the question concerning competence. The time required to reach a correct diagnosis is a key issue for RDs patients [3], with low awareness of RDs among physicians believed to be a significant reason for late diagnosis or misdiagnosis of RDs patients [4]. As one of the authors of a study noted, "[t]he lack of knowledge and experience with RDs,

combined with a limited ability to acknowledge this and act accordingly, is serious for the users and for the credibility of health professionals" [5]. The interest in the competence of medical personnel results, among others, from the "diagnostic odyssey" described by Black et al. [6], which encompasses three different periods: patient interval (starting from the first time the patient/caregiver notices what will later be classified as a symptom of the disease); primary care interval (beginning with the first patient visit to primary care); and specialist care interval, the time when the diagnosis is finally made. It seems that there are possibilities to shorten each of the three periods, however, unquestionably patients with RD currently face diagnostic delays. As McKay pointed out, "[t]he word 'odyssey' is not only used to highlight the average 5.6-year wait that people face before diagnosis, but it also conjures up an epic journey with giant-sized obstacles and detours along the way" [7].

In recent years, research on the knowledge and opinion of healthcare professionals and students about RDs has been conducted in several countries, e.g., in Belgium [4], Germany [8], Spain [9,10], and Poland [11-13]. The declared RDs-related knowledge of healthcare specialists and students does not seem promising for patients (Table 1).

The authors of the studies point to insufficient preparation, both of students and working healthcare professionals, to care for a patient with RD. It

is recommended that the academic medical education on RDs be revised [4,12] and a continuous educational programme should be introduced [9].

Another crucial point identified in the research of individuals with RD as experts on their condition is that health professionals need to be conscious about the limits of their competence, and there is a need for revising the patient-provider relationship [5]. Research has shown that knowledge about RDs comes to a greater extent from the Internet than from university schooling, hence the existing medical education needs to be revised. Although the medical university curricula in various countries contain education on RDs, it is not standardised [7].

Assuming that the number of these diseases is estimated to be at least 7,000 [14], the question arises whether healthcare professionals can know about every RD and whether it makes sense to teach about so many uncommon diseases. As Van Groenendael et al. [15] pointed out, "[t]he current model of healthcare in Europe and beyond is well designed to cater for patients with common conditions. However, these care delivery models are not suited for patients with complex multi-system diseases with health needs that cross subspecialties", especially when conditions are rare. The frequency of misclassification of rare and non-rare diseases among medical students reflects the above-described problem and does not offer much hope for the proper diagnosis and treatment of RDs patients (Table 2).

Table 1. Declared healthcare specialists/students' knowledge of RDs depending on speciality and place of working [8,11,12]

Group	Declared knowledge (% of respondents)	
	Lack/Little	Good/Very good
Medical students	95.4	4.6
General dentists	77.7	22.3
Specialist dentist	81.9	19.1
Dentist - University employees	50.0	50.0
General nurses	97.4	2.6

Table 2. Misclassification of rare and non-rare diseases by medical students [11,13]

Rare disease misclassified as a non-rare disease	Respondents (%)	Non-rare disease misclassified as a rare disease	Respondents (%)
Multiple sclerosis	74 (13)	Munchausen syndrome	51 (11)
Cystic fibrosis	76 (11); 55 (13)	Crohn disease	34 (13)
Phenylketonuria	60 (11)	Fibromyalgia	33 (11)
Huntington disease	54 (13)	Halitosis	28 (11)
Sarcoidosis	52 (13)	Type I diabetes	5 (13)

Another problem is related to the RDs-dedicated healthcare system. It seems that the changes should include creating multidisciplinary units and high-quality practice guidelines [9,16] as well as digital platforms about RD symptoms [4]. Many specialists believe that RDs are so rare that the chance of encountering a patient with a specific RD is purely theoretical. However, with all RDs considered, the average doctor meets a patient with an RD on a daily basis [12].

Gaining experience in treating RDs is limited to specific diseases and specialised units of the healthcare system, therefore, progress in diagnosing, treating, and understanding a particular RD requires the synthesis of as much available data from multiple patients and institutions as possible [17]. It is worrying that for so many years, it has not been possible to create an effective clinical decision support system [18-20]. There is no doubt that such a system could support centres diagnosing patients who are likely to suffer from an undiagnosed RD. It is believed that general practitioners should also be an integral part of any initiative undertaken nationally to improve the diagnosis and management of RDs [21]. It seems that all healthcare professionals, as well as general practitioners, need formal training in RDs as a corner-stone of medical education [22,23], and perhaps patient-focused organisations could and should support such programmes [24].

Undoubtedly, a breakthrough in the diagnosis of RDs is exome sequencing. However, it should be remembered that currently in over 70% of patients in whom there was a high degree of pre-test suspicion for a monogenic RD, exome sequencing provides no molecular diagnosis [25]. Nonetheless, extensive and accurate phenotyping is essential to establish an appropriate link between potential candidate genes and disease characteristics [26]. In any case, it is the healthcare professionals, their knowledge and competence, that are responsible for the proper up-to-date diagnosis.

It is not known precisely how many patients suffer from RDs but certainly, there are more than anyone would have imagined a few dozen years ago, constituting a challenge for modern medicine. In order to address this challenge, two changes seem necessary. The first concerns the way of teaching at medical universities and

the functioning of medical curricula. The second adjustment relates to the organization of the healthcare system with the implementation of new technologies supporting the diagnosis of RDs. The problem is not marginal and only well-trained staff and an adequately organised health care system can deal with it.

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Conflict of interest statement

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