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Living better and longer with cystic fibrosis

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Cystic fibrosis (CF) is the most common autosomal recessive disorder in Caucasians. Since the first description of CF as a separate disease entity by the pathologist Dorothy Andersen in 1938, the demographic and clinical characteristics of the patient population have changed beyond recognition [1]. At the time of the first description of CF, the diagnosis was devastating, with more than 70% of children dying during the first year of life, usually from meconium ileus, severe malnutrition or respiratory failure.

Considerable changes in both CF course and survival of patients have been seen. It is no longer a disease exclusively of childhood. The proportion of adult patients in many countries is very high. The number of adults with CF now outnumber the children with CF in developed countries [2]. In registry of United Kingdom for example, 57.6% of all CF patients are classified as adults [3].

In Poland, this exceeded one-third of patients in 2012. This needs good translation from children to adult centres in order to continue good standards of care. The best locations for these centres may be academic respiratory departments.

It is very interesting to present in this issue of “Advances in Respiratory Medicine”, two articles related to CF problems. In an article by Chatterjee *et al.* [4], the example of national trends in the CF status of patients and care was presented. This information should be helpful in developing practice guidelines in order to improve quality of inpatient care, decreasing iatrogenic complications, providing valuable prognostic information, and identifying new challenges in the management of the increasing population of individuals with CF. A second article by Hassanzad *et al.* [5]

from Iran gives us an opportunity to recognize another example of a CF national group. Clinical characteristics may be an important example. The interesting data about CF population presented in this paper should be a challenge for respiratory physicians who should develop their responsibility for CF patients.

In Poland, cystic fibrosis occurs in approximately one in 4,400 newborns. It is estimated that the annual incidence rate in Poland amounts each year to approximately 70–80 new cases [6]. According to the Polish Cystic Fibrosis Registry maintained by the Polish Cystic Fibrosis Society (now suspended because of transitional period in legislation), in 2012 there were about 1,500 patients with this disease in our country while the percentage of adult patients, who had completed 18 years of age, was 33%. The data confirm a significant increase in survival time of patients in recent decades in our country. It has become an important challenge to take care of a group of more than 500 adults with cystic fibrosis. Respiratory physicians dealing with the problems of adults from relatively recently are discovering the necessity of providing care for these patients. Even though CF is a multiorgan disease, progressive lung destruction is the most common cause of morbidity and mortality. Especially the problems associated with the respiratory system seem to be the most frequently manifested with such problems also comprising the majority of the causes of failure and death.

The reason for a steady improvement in median survival with an increasing adult population is a result of multiple factors, classified into genetic and non-genetic groups. Non-genetic factors include environmental (sex, tobacco smoke expo-

sure and climate), health-care related (access to special CF centres, infection control quality and adherence) and socioeconomic factors.

Poor nutrition, colonization of respiratory tract pathogens such as *Pseudomonas aeruginosa* or *Burkholderia cenocepacia*, untreated CF-related diabetes, and the female sex are well established factors associated with worse outcomes in CF. The crucial key points over the years have included the implementation of rational antibiotic regimens, pancreatic enzymes, optimization of nutrition, effective airway clearance with the use of physiotherapy techniques, drugs which increase sputum clearance (e.g. dornase alfa), lung transplantation, and the introduction of mutation-specific protein-modulating drugs. The emergence of personalized pharmacological CFTR potentiators and correctors, based on a CFTR genotype, offers exciting new possibilities for some patients with CF.

These, combined with better CF care delivered by a specialist multidisciplinary team moderated by respiratory physicians, have been the most important factors leading to patients living longer and with a better quality of life.

Improvements in the diagnosis of CF have also contributed to an increase in survival. The diagnostic possibilities in Poland, related to a newborn screening which is obligatory and well organized, could be an example for other countries.

Respiratory manifestations of CF are always the most important challenges of current care. Significant improvement in the management of the respiratory complications of CF have meant that extrapulmonary complications are becoming more prevalent. Extrapulmonary manifestations of CF are an increasing problem as the morbidities of aging are added to the “usual” CF complications. CF-related diabetes occurs in about 45% of adults over 40 years of age and is an independent predictor of mortality. CF-associated liver disease is also a difficult problem. Chronic kidney disease increases with age while the risk doubles with every additional ten years of age. The prevalence of osteoporosis and the risk of malignancy increases with age. A higher incidence of osteoporotic fractures in CF patients implicates screening and early treatment of osteoporosis. Current data demonstrate a significant increase in gastrointestinal cancer risk in CF.

There is a long list of important and very different challenges which are important for patients, their families and CF medical teams. These range from respiratory failure and lung transplantation to various social issues.

Disease complexity is changing in CF as the life expectancy of the patient population increases. The unique subset of microbes that commonly infect the lower respiratory tract of individuals with CF has evolved over time. There is also a growing recognition of the clinical importance of non-tuberculous mycobacteria in CF. Fungal infections should also be considered: attention to fungal infections and the evidence of clinical impact has increased. Fungal colonization and infection in this group of patients is frequent and is dominated by *Aspergillus fumigatus*.

It has been confirmed that the health care of CF patients provided in specialist centres is more effective and results in better clinical outcomes. In the indications concerning the care of patients with CF it is suggested that centres include the care of at least 100 adults [7, 8].

International and national standards are a good aid in the work of adult specialists. In recent years, standards have been published describing the principles of care [9], the structure of the organisation of CF centres [10] and principles of infection control [11]. Polish guidelines have also been presented which are becoming an important element of education of medical staff [12].

The transition of young adults with CF from paediatric to adult medical care is an important priority. The transition to adulthood, a developmental process of skill-building in self-management supported by the health system, is important for the successful transfer to adult CF care. Interesting transition programs from childhood to adult CF care have also been presented in recent years [13, 14]. There is also a place for such programs in the Polish context. The transition and transfer process needs to be integrated into the patient’s and family environment CF is poised to become a model for the successful transition of care for all adolescents and young adults with chronic health conditions and special health care needs.

CF treatment and care are changing rapidly and have resulted in improved patient survival. The burden of care and disease complexity are increasing. It implicates to take the best possible care concerning medical and non-medical problems and which should be carried by multi-specialist team of medical staff. The standards of paediatric CF care are well established in Poland. The necessity of the formation of specialized adult CF centres will become the most important challenge of future decades.

Conflict of interest

The authors declare no conflict of interest.

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