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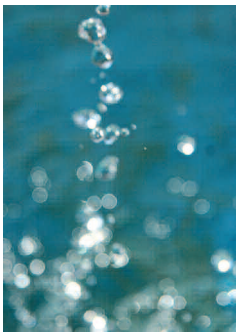

The Threat Posed by INFECTIOUS DISEASES

Need for Reform of Infection Control

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RUDOLF SCHÜLKE STIFTUNG
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PREFACE

In 1996 the Schülke Foundation, then chaired by Prof. Dr. Knut Olaf Gundermann, compiled the *Memorandum on the Threat Posed by Infectious Diseases – Need for Reassessment and for a New Prevention Strategy in Germany* on behalf of the professional societies and medical associations in the field of infectious diseases. At that time the German Federal Epidemic Act (Bundesseuchengesetz) was amended, giving rise to a new structuring of the Robert Koch Institute, to extension of the notification obligation and to the creation of an exemplary epidemiological reporting system. In the opinion of the Scientific Council, the Robert Koch Institute has evolved into a reputable national and international institute for prevention and control of infectious diseases. The Memorandum published in 1996 has also helped drive this process, thus leaving its imprint on that period of time.

Despite this very positive development there are a number of demands that were outlined in the former Memorandum, and which are mainly the responsibility of the different federal states, which have not been addressed. On the contrary, in many respects there has been **further aggravation of the misguided developments seen in the domain of infection prevention**. In some federal states, despite urgent warnings, in-house scientific capacities and infrastructures relating to infection prevention and control have been virtually abolished and certain areas of the public health service have been severely weakened because of cutbacks on staffing. Today, it is no longer possible to assure the education of a new generation or the training of, in particular, physicians in infection prevention due to the closure of the hygiene departments at German universities.

Furthermore, the past 10 years have produced a plethora of novel scientific insights and epidemiological developments that have had a major impact on risk assessment and risk-minimising strategies. These include
– the sharp increase in the world population, with a commensurate increase in poverty worldwide,
– the increase in travel, facilitating the ever more rapid spread of microbial agents (e.g. SARS),
– the inadequate supply of safe water to more than 1 billion people and inadequate sanitary situation of more than 2 billion people.

This scenario also increases **the risk of a worldwide pandemic**. While, on the one hand, diseases that formerly posed a dangerous threat of epidemics such as cholera, typhoid fever, smallpox and plague are now of virtually no consequence or have been completely eradicated at least in the developed countries, there has been on the other hand a drastic increase in particular in contact-mediated as well as food- and waterborne diseases.

In its first epidemiological report published in 2007, the European Centre for Disease Prevention and Control (ECDC) identifies the **increase in antibiotic resistant microorganisms and nosocomial infections as the most important threat to health in Europe**. This also holds true in the case of Germany. Between 2000 and 2002 Germany witnessed a rise of more than 10 % in the MRSA rate, the highest in Europe. In contrast, in other European countries, e. g. France, it has been possible to achieve a major reduction in MRSA thanks to the astute allocation of priorities at a political level. A further example of the threat posed by nosocomial infections (also known as 'healthcare associated infections') is the salmonella outbreak that occurred in 2007 in the state of Hesse, the biggest salmonella outbreak seen anywhere in the world in the past 20 years and which needed more than a month to bring under control. There are also risks that are difficult to calculate with regard to bioterrorism and pandemics caused by, for example, influenza or SARS. All this must serve as a warning that the resilience needed to safeguard the health of the public against the threat of communicable diseases is by no means assured in Germany or worldwide.

There is thus an urgent need to face up to the health risks posed by communicable diseases as well as to focus on the **prevention potential to be realized by bolstering the infection control (hygiene) and public health infrastructures**, for which the various federal states are responsible, and to **reform hygiene and infection control in line with future needs**. This calls for a political committment and the setting of priorities, for the creation of well-trained human resources' capacities and an institutional infrastructure as well as for optimisation of training, in particular in medical disciplines by, among other things, establishment of chairs for hygiene and public health.

We hope that his present publication will lend impetus to new discussions, drive prioritisation and contribute to the creation of infrastructures for enhancement of health protection and, as such, will reinforce resilience in the face of the threat posed by emerging and re-emerging communicable diseases.

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Bonn, September 2007

Prof. Dr. med. Martin Exner
Chairman of the Rudolf Schülke Foundation

SUMMARY

Despite the enormous successes scored worldwide, infectious diseases continue to pose one of the greatest threats to mankind. This is borne out by their major contribution to morbidity and mortality, besides cardiovascular diseases as well as malignant and chronic degenerative diseases. They are characterized by **dynamics for which no prognosis can be ventured** and represent a major economic burden not only for the health services but also for the overall national economy. Hence combating them presents a **continual medical, political and social challenge**.

There are myriad reasons underlying this continual potential threat: environmental factors, socioeconomic conditions, technical developments, the increase in travel and international ramifications, e. g. in the supply of foodstuffs, the growing number of population groups susceptible for acquiring infections as well as the **metamorphic and adaptability profiles being evidenced by microorganisms**. Set against that background, there has been a continual trend in the emergence of new communicable diseases. Infectious diseases that were deemed to have been brought under control have not yet been fully eradicated.

Novel virulent variants of known or hitherto unknown pathogens, such as HIV, are evolving and call for **→ continual adaptation of preventive and therapeutic approaches**. This is also borne out by, among other things, the danger of a pandemic spread of a new virulent influenza variant.

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It must be expected that novel variants of known or hitherto unknown pathogens continue to emerge and pose a threat.

Despite the successful usage of available vaccines there are still considerable **vaccination gaps** in the population, in particular among adults, a fact that is also apparent in Germany. To date, there are no vaccines in sight against HIV/AIDS, hepatitis C or malaria.

As regards the treatment of communicable diseases, the **worldwide increase in antibiotic resistance among bacteria and fungi** continues to play a pivotal role. It is likely that soon there will be no antibiotics at all available against certain pathogens, thus ushering in the post-antibiotic era in which the antibiotics currently available against bacterial and mycological agents will no longer be effective.

Thanks to the insights gleaned from novel diagnostic techniques, there is growing evidence that a broad spectrum of microbial agents may be the cause of, or are cofactors in, **chronic degenerative diseases or malignant diseases**. The epidemiological role of microorganisms as the causative agents of such diseases by far exceeds that of chemical environmental pollutants with the exception of cigarette smoking.

In addition to those factors already mentioned in the summary to the Memorandum published in 1996, the existing threat has been drastically intensified by **bioterrorism** and by the **possibilities now available to humans to modify the virulence profiles of microorganisms**, something that could have major public health implications. In expert circles it is assumed that it is no longer a matter of *whether* but of

when such genetically modified, and highly virulent, microbes will be deployed in bioterrorist attacks.

A fact often overlooked is that the majority of the infectious diseases occurring in the developed countries → **are contracted in private households or in the workplace as well as in specific risk areas such as hospitals and nursing homes**.

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The majority of infectious diseases occuring in the developed countries are contracted in private households or in the workplace as well as in specific risk areas such as hospitals and nursing homes.

However, the **risk perception** in the German population with respect to the importance of communicable diseases, and also as regards the requisite preventive and control measures that can be taken by each individual, is not sufficiently anchored. The possibilities for treatment of infectious diseases are considerably overestimated against the background of the increasing trend in antibiotic resistance.

Among the socioeconomic factors that contribute to the spread of infectious diseases is the estimated **increase in the world population** by up to 2 billion people in the next 20 years. It can be assumed that the **major deficits in the sanitary infrastructure**, in particular in the megacities, will be further aggravated. Even at present up to 1.1 billion people have no access to **safe drinking water** and 2.5 billion people are compelled to live under inadequate hygienic conditions. HIV/AIDS, tuberculosis and malaria have by no means been brought under control worldwide and in some African countries have contributed to a dramatic reduction in the average life expectancy.

In Germany, compared to the situation in 1996, it has been possible over the past decade to score major successes as regards the infrastructure for prevention and detection of infections. These include the enforcement of a modern **Protection Against Infection Act** (*Infektionsschutzgesetz*) and centralisation of tasks relating to infection prevention and control by the **Robert Koch Institut**.

Despite these resounding successes, there are still considerable **deficits in communication with the public** with respect to the importance of communicable diseases and of basic hygiene measures and the willingness to engage in immunisation to assure high vaccination coverage.

The **infrastructure** of well-functioning networks of hygiene and microbiology institutes at the universities is still endangered and to date it has not been possible to put a stop to their dismantling. This scenario gives rise to considerable risks both in terms of the **education, training and continuing professional development, research**, and public health services as well as of effective infection management.

Hence the partial successes scored over the past 10 years must be viewed as a baseline situation and as motivation for the further improvements urgently needed and must not be allowed to halt the train of developments.

But Germany, thanks to its historic experiences and accomplishments in the field of prevention and control of infectious diseases as embodied in particular by Robert

Koch, has a special **responsibility** to contribute on the world stage to the enhancement of infection prevention and control, to optimise education, training and continuing professional development programmes and to support development aid programmes, in its own interest too. The **UN Millennium Goals** serve as an orientational guide here, and each country should help to implement them.

There is also a need to **coordinate** the numerous experiences and scientific structures within Europe so that maximum benefit can be derived from them within Europe and also worldwide.

As such, today the main emphasis is no longer on discovering new microorganisms and characterising them with the help of molecular biology methods, as was the case a century ago. Rather, what is needed is to harness consistently the existing scientific insights while also acknowledging the pivotal role of other essential factors (political committment, social aspects, administrative structures, infrastructural prerequisites, historic, cultural, geographic circumstances, training, communication, inter alia in the various countries worldwide), so as to bring the threat posed by infectious diseases under control. In the **→ holistic bundling of these activities** lie the scientific challenges of the next, possibly, 100 years. If this does not succeed, the threat faced can have existential implications once again, even for the developed countries.

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In the holistic bundling of all activities relating to prevention and control of infection lie the scientific challenges of the next 100 years. If this does not succeed, the threat posed can have existential implications once again, even for the industralised countries.

The primary tasks for the coming years are as follows:

- **Enhancement of measures for health protection and health promotion**
- **Conductance of a different form of risk communication**
- **Further development of vaccines and increase of vaccination uptake rates**
- **Development of innovative diagnostic techniques and therapeutic agents**
- **Inclusion of the discipline of infection control (hygiene) in the education, training and continuing professional development of physicians and medical personnel**
- **Creation of networking systems between hygiene departments and microbiology institutes**
- **Expansion of public health infrastructures**
- **Promotion of a well-delineated infrastructure for human resources' and equipment capacities to meet everyday challenges as well as to deal with a crisis situation in Germany.**