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26th Annual Meeting of the German Society for Travel Medicine (DFR) Leipzig, Germany, 7-9 September 2023

Thomas Küpper

Vice President of the Deutsche Fachgesellschaft für Reisemedizin (DFR)
The scientific management and Congress President

Conference reports

About the Meeting

This year the meeting included again a wide variety of topics. Beside of 'typical' ones like malaria (Rothe) or actual aspects concerning vaccinations (Burchard, Kling) other lecturers reported about international aid in the case of catastrophies (Schad), polar regions (Kohlberg), volcano tourism (Heggie), diving medicine (Koonen and Schröder), rare diseases like naegleria (Heggie), and even work in space (Ewald). A session focused tricky cases from daily routine travel medicine. There was also a special invitation to young scientists, students and clinicians with a specific event. Poster presentations added topics for discussions.

The presented abstracts include lectures and posters and are listed in alphabetical order of the first author. The presented abstracts include lectures and posters and are listed in alphabetical order of the first author.

Keywords

- German Society for Travel Medicine
- DFR
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Corresponding author

Prof. Thomas Küpper, PhD, MD, FISTM, FFTM RCPS (Glasg.)
e-mail: gs@fachgesellschaft-reisemedizin.de
Graf-Adolf-Straße 69
40210 Düsseldorf, Germany
tel. +49 (0) 211 520 25 81

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Incidence of shark attacks along the South African coastline and protective measures that exist

Peter Anderson

University of the Witwatersrand, Division of Emergency Medicine, Witwatersrand; RSA & Sandton Medi-Clinic Emergency Unit, Sandton, Republic of South Africa

Background: The ocean is the established home of a number of predators, none more concerning for the habitual swimmer, than the notorious great white shark. In 2022 the idyllic setting of Plettenberg bay, a famous tourist destination along the Garden Route of South Africa's coastline, was where two swimmers lost their lives following attacks by a great white shark, both within 6 months of each other.

Cause for concern: Incidence of shark attacks are well known, around the world, to be statistically on the side of the swimmer rather than the shark and standard risk mitigation measures are generally well understood. However for two fatal attacks to have occurred in the same Bay and within such a short period of time, justifiably raised the question of why?

Great white sharks: Their habits, stressors and intuition are more advanced than initially understood. The seal colony that exists in Plettenberg Bay has long been an explanation for the presence of the great white sharks but could there be more to their movements?

Medical injuries: A bite from a great white shark has the potential to be fatal based on pure size of the bite rather than the anatomical area involved.

Rescue: From immediate first aid to the National Sea Rescue Institute, the local hospital network is geared for the management of such trauma cases although may require helicopter medivac to centres of excellence

Prevention: Understanding the habits of the shark's behaviour that can determine risk scenarios, together with advanced spotting techniques that involved community volunteers, a communication network and the use of drones and microlights have all helped create a network of awareness that allow for safe swimming.

Travel and rheumatism

Ioana Andreica

Ruhrgebiet Rheumatism Center, Herne; Ruhr University, Bochum, Germany

Background: Inflammatory rheumatic diseases are chronic entities involving various organs and systems with complaints of the musculoskeletal system. In a recent study, the German Rheumatism Research Center Berlin estimates the prevalence at 2.2 to 3.0% of adults, which corresponds to 1.5 to 2.1 million affected persons.[1] Thanks to new therapies and globalization, more and more people with rheumatic diseases (PRD) are able to travel without restrictions.

Some aspects need to be considered In addition to clarifying the ability to travel, all medications of daily use must be carried or stored in sufficient quantities and under prescribed conditions. Side effects and interactions between immunosuppressants and, for example, any necessary malaria prophylaxis should be considered.

The significantly increased risk of infection due to the inflammatory disease and immunosuppression should also be considered before deciding to travel. Vaccinations are a particularly important issue. Vaccinations should be administered early and with sufficient interval from ongoing immunosuppression. The administration of live vaccines, such as yellow fever vaccine, is also an issue.

Many PRD are limited in mobility, so when planning a travel, the additional body burden by climate, jet lag and activities at the vacation site must be addressed. Under ongoing immunosuppressive therapy, but also due to the risk of relapse, as in patients with SLE, sun exposure should be avoided or special protection should be provided.

Conclusion: A thorough agreement between rheumatologists and travel medicine specialists is essential for a stress-free and health-promoting stay in the destination country.

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Update: Vaccinations in travel medicine

Gerd Burchard

Bernhard Nocht Institute for Tropical Medicine, Hamburg, Germany

As international travel increases, an update on the current guidance regarding travel vaccinations is important for healthcare providers. Current developments in travel vaccinations relate to new data on the vaccines used to date in travel medicine and the availability of new vaccines. The epidemiology of vaccine-preventable diseases is changing, examples are yellow fever outbreaks in different countries, outbreaks due to circulating vaccine-derived poliovirus (cVDPV, especially cVDPV2) or the evolving Japanese encephalitis situation in Australia. Accordingly, the recommendations, for example by the Standing Committee on Vaccination (STIKO) are regularly updated (www.STIKO-web-app.de). With regard to some standard vaccinations, there are new study data and results from systematic reviews, e.g. on the question of the duration of protection from a yellow fever vaccination or the duration of the boosterability after rabies PrEP. There are new additional vaccines for some standard vaccinations, for example for hepatitis B (Heplisav B and PreHevBri) or for cholera (Vaxchora) – fulfilling unmet needs that currently exist in the travel medicine prevention landscape. Finally, there are new vaccines against diseases that were previously not vaccine-preventable, in particular the Takeda vaccine against dengue fever. Vaccinations against other viral diseases such as Zika or Chikungunya can be expected in the near future.

As if made for space: Research and life on board the ISS

Reinhold Ewald

University of Stuttgart, Institute of Space Systems, Germany

Life on Planet Earth has developed under the permanent and ubiquitous tug of gravity. Weightlessness, as astronauts experience in an orbit around Earth as the result of a compensation of forces, thus should be an extreme challenge to their 1g-adapted body functions. It is one of the big surprises to every newcomer into Space that humans aboard a space station even during long-term missions of half a year or more do not have to use elaborate technical means to sustain vital functions be it cardio-vascular, digestion related, or renal. This also is true for the handling of quotidian actions like hygiene or the use of a toilet. This ability of the human body to adapt to an extreme and sudden change of ambient conditions has been and is been extensively studied in life science experiments in Space.

Space-won results have helped to understand and counteract against degenerative or other diseases on Earth (immune deficiencies, old age symptoms, long-term immobilization) and have led to innovative therapeutical treatments.

The author during his three-week long space flight aboard a space station in 1997 has performed extensive medical experiments in a controlled 'metabolic ward in Space'. The talk will highlight the effects of weightlessness on the human body and countermeasures developed to sustain health during flights to the Moon and Mars.

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Travelling with pre-existing cardiac disease

Norbert Güttler

German Air Force Centre of Aerospace Medicine, Cologne, Germany

The prevalence of cardiovascular disease remains high, although cardiovascular mortality in countries with high average income has fallen significantly over the last two to three decades. Improved cardiological treatment methods enable more and more heart patients to enjoy a symptom-free life. This also includes travel. For cardiac patients, travel is usually possible if they are not in a stage of cardiac decompensation, suffer from acute coronary syndrome or have recurrent attacks of severe arrhythmias or syncope.

Nevertheless, holiday travel includes special risks and requirements for which cardiac patients should be prepared. Already during the outward and return flight,

patients are exposed to a reduced oxygen partial pressure and a significantly lower humidity in the aircraft cabin. At the holiday destination, changed climatic conditions with hot and humid weather, reduced hygienic standards and, depending on the holiday destination, exposure to altitude may be expected. Further particularities result from the respective heart disease, which may require the intake of certain medications, anticoagulation or the supply of medical oxygen in certain situations.

The lecture describes which heart patients can go on holiday trips and which should rather refrain from doing so. It points out safety intervals after certain cardiac events, operations or interventions. It gives advice on suitability for air travel and on the particularities of exposure to high altitudes. Precautions for special climatic conditions are covered as well as vaccinations recommended for cardiac patients, recommendations for anticoagulation, carrying medical documents and recommendations for patients with pacemakers or implanted defibrillators.

If these tips are followed, holiday travel is now possible without any problems for the vast majority of heart patients.

Unwanted travel souvenirs

Alessandra Handisurya

Medical University of Vienna, Department of Dermatology, Vienna, Austria

As the COVID-19 pandemic has gradually subsided, people are returning to normal life and are resuming their travel activities. Not only travels to exotic distant regions, but also travels within Europe – the latter frequently in the company of the beloved pets – are becoming increasingly attractive. However, sometimes travellers find an unpleasant surprise after their return from vacation.

These can include viral, bacterial, helminthic and parasitic diseases, which may be imported within the body of the human traveller, in the accompanying pet animal or in the luggage. Here, a short summary on the clinical presentations, diagnostic procedures and therapeutic options will be presented on travel-related diseases which can be acquired accidentally from the environment (cimicosis), contracted by blood-feeding anthropods, particularly mosquitoes or flies (dirofilariasis, myasis), by close contact with infested humans (scabies) or by engaging in sexual activities (gonorrhoeae, chlamydia) at the travel destinations. Importantly, travel is also inextricably linked with antibiotic resistance. The causative agent of gonorrhoeae, *Neisseria gonorrhoeae*, which has for many years been associated with sex tourism, will exemplify the importation of resistant bacterial strains.

Travel-related diseases can be reduced with appropriate prevention, preparation and by non-promiscuous behaviour. Health professionals should consider the possibility of infectious diseases in returned travellers presenting with compatible symptoms.

Cardiovascular risks of expatriate employees

Bianca Hartmann[1,2], Thomas Küpper[2,3], Mariam Konner[3,4]

[1] St. Brigida Hospital, Department of Anaesthesiology, Simmerath, Germany
[2] WHI Work & Health Intl., Düsseldorf, Germany
[3] RWTH Aachen Technical University, Department of Occupational, Social and Environmental Medicine, Aachen, Germany
[4] Centre for Occupational Medicine, Bergisch-Gladbach, Germany

Background: Frequently traveling employees (especially construction workers / workers in service and maintenance) with long-time stays abroad are considered as a high-risk group for cardiovascular and metabolic diseases. The costs of overseas postings are high, but repatriations due to illness are significantly more expensive.
Methods: A total of 177 / 185 workers (10 women / 167 men) who were regularly posted for weeks to months to e.g. Pakistan, India, Indonesia, or Bangladesh, were included in this study. Medical history and laboratory parameters were obtained considering cardio-metabolic aspects and lifestyle factors. Important parameters were age, blood pressure, BMI, nicotine abuse, HbA1c and lipid metabolism. The ESC score and Framingham score were determined. The former was adapted to European population and rates the risk of a fatal cardio-circulatory event for the next 10 years while the latter estimates the risk of a myocardial infarction for the next 10 years.
Results: 48.6% of the workers were older than 50 years. 75.3% had systolic blood pressure above 140 mm Hg and 9.2% above 160 mm Hg. HbA1c level increased significantly with age. 5% showed manifest diabetes

mellitus (DM) and 14.9% pre-DM according to current DDG guidelines. 60.8% had a cholesterol value above 200 mg/dl. With higher age, increased cholesterol and LDL levels were associated while HDL levels decreased. The ESC score calculated a 'moderately' high risk of fatal cardiovascular disease in 75.5% and even a 'very high' risk in 8.5%. The Framingham score showed a linear increase with increasing age. Accordingly, 28% of the employees were classified with a 'medium' risk and 16.6% with a 'high' risk.

Conclusion: Employees with regular overseas postings have a high-risk profile for cardiocirculatory and metabolic emergencies with increasing age. This is particularly relevant for postings to countries with less medical infrastructure. Comprehensive (travel) medical advice prior to travel and good correspondence with the attending physician are indispensable.

Altitude suitability for travellers

Miriam Haunolder

St. Antonius Hospital Eschweiler, Department of Internal Medicine, Germany

Alpine trekking offers travelers valuable personal experience through scenic panoramas and successful experiences in physical challenges. With an altitude exposure of about 2500 m or more, the effects of hypobaric hypoxia on the organism must be taken into account. Acute mountain sickness (AMS) poses a significant health risk for individuals ascending to high altitudes. Predicting an individual's susceptibility to AMS is crucial for better risk management and informed decision-making. This lecture aims to explore various factors that contribute to an individual's likelihood of developing AMS and provide insights into predicting susceptibility.

On the basis of a summary of relevant publications, the current lecture is intended to give an overview of the individual risk factors such as age, gender, previous altitude exposure and personal fitness as well as the external influencing factors such as the ascent profile and achieved altitude and aims to provide attendees with an enhanced understanding of the factors contributing to AMS susceptibility. By raising awareness of these factors, attendees will be better equipped to assess their own or their patient's risk and implement appropriate preventive measures when ascending to high altitudes.

Geotourism and volcanoes: Are we playing with fire?

Travis W. Heggie

Bowling Green State University, Ohio, USA

Volcanoes are no strangers to tourism. Tourists and other adventure travelers have long been interested in visiting volcanoes such as Mt. Etna in Italy, Mt. Fuji in Japan, and the active volcanoes of Hawaii. In recent years, tourism to active volcanic activity in Iceland, Costa Rica, Vanuatu, and Ethiopia has increased in popularity.

Despite the increased popularity of volcano tourism, travel to volcanoes is not without risk. Airlines are aware of the hazards presented to commercial flights but the individual tourist and travel medicine practitioners. For example, the volcanic landscape, the preparation of the individual tourist, and pre-existing health conditions can result in serious injury, illness, and death. Moreover, one of the least recognized hazards confronting tourists is the presence of volcanic fumes such as carbon dioxide (CO_2), sulfur dioxide (SO_2), hydrogen chloride (HCl), hydrogen sulfide (H_2S), hydrogen fluoride (HF), carbon monoxide (CO), nitrogen (N_2), hydrogen (H_2), helium (He), methane (CH_4), and radon (Rn) which are common in, during and in between eruptions.

With the goal of creating awareness for both the individual traveler and practitioners of travel medicine, this presentation will review the incident reports and identify the contributing factors of 800 injuries, illnesses, and fatalities in volcanic environments.

Naegleria fowleri: An emerging killer in the United States

Travis W. Heggie

Bowling Green State University, Ohio, USA

Naegleria fowleri is a deadly human pathogen recognized as the causative agent of Primary Amoebic Meningitis (PAM). *N. fowleri* is a free-living amoeba commonly found in warm freshwater environments such as natural or man-made lakes, hot springs, and resort spas frequented by tourists. PAM infections have a ortality rate between 95%–99%.

An underreported condition and previously thought to be a rare condition, the number of reported PAM

cases in the United States is increasing each year. This presentation reports on the distribution and associated activities of 138 PAM cases in the United States. The data identifies a northward trend in PAM fatalities raising questions about the potential role of climate change and poor water quality conditions in the United States. PAM is difficult to diagnose because the clinical signs of the disease are similar to bacterial meningitis. Thus, the key to diagnosis is physician awareness and clinical suspicion. Miltfosine, an oral drug developed in Germany to treat breast cancer, has been repurposed and shown to be successful in treating PAM cases.

Efficacy and safety of the new dengue vaccine Qdenga – analyzed in preparation for a vaccination recommendation in Germany

Kerstin Kling[1], Wiebe Külper-Schiek[1], Jonas Schmidt-Chanasit[2,3]

[1] Robert Koch Institute, Department of Infectious Disease Epidemiology, Immunization Unit, Berlin, Germany
[2] Bernhard-Nocht-Institute for Tropical Medicine, Hamburg, Germany
[3] Universität Hamburg, Faculty of Mathematics, Informatics and Natural Sciences, Hamburg, Germany

Background: Dengue virus (DENV) is one of the most common arthropod-borne viruses. Almost half of the world's population is exposed to DENV[1] with re-infections being possible. A second DENV infection carries the risk of a severe course of the disease, which is most likely caused by antibodies resulting from a first infection with the formation of immune complexes and increased viremia (antibody-dependent enhancement, ADE). In December 2022, a new dengue vaccine (Qdenga) has been approved by the European Medicines Agency (EMA) for individuals ≥ 4 years of age.[2] The risk of severe disease due to breakthrough DENV infection in vaccinated DENV seronegative travelers needs to be evaluated carefully.
Methods: Epidemiology of cases in German travelers and results of a literature review on efficacy and safety of Qdenga vaccine were discussed with the experts from the Standing Committee on Vaccination (STIKO) and the German society for Tropical Medicine, Travel Medicine and Global health e.V. (DTG).[3]
Results: Trials show a vaccine efficacy (VE) against virologically confirmed dengue in the first, second and third year after vaccination in 4–16 year-olds of 80.2% (CI: 73.3–85.3), 56.2% (CI: 42.3–66.8), and 44.7% (CI: 32.5–54.7), respectively.[4] Efficacy differed between serotypes with reduced VE against serotypes 3 and 4.
Conclusion: The potential risk of ADE in DENV secondary infections highlights the need of a thoughtful consideration of the vaccination strategy for travelers. STIKO's recommendation is expected to be published in autumn 2023.

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Polar expeditions in times of Corona or: Crossing the border on a folding bicycle. Medical and logistical challenges

Eberhard Kohlberg[1], Tim Heitland[1]

[1] Alfred Wegener Institute – Helmholtz Centre for Polar and Marine Research, Bremerhaven, Germany

In winter 2020, during the first part of MOSAiC – the largest Arctic expedition in history – the Corona Pandemic unexpectedly hit us. The rapid spread seriously endangered the further execution and continuation of the expedition. The German polar research vessel 'POLARSTERN' was to remain in the Arctic ice for one year to carry out extensive scientific work. The expedition

involved 600 scientists from 19 nations. The expedition had begun in September 2019 and during the year 2020 scientists and ship's crew had to be exchanged several times. The greatest risk was carrying an infection on board at a time when there was no drug therapy and no vaccination yet. With the severe courses initially observed, an outbreak of SARS-CoV-2 on board would have meant the end of the expedition.

Scientists and ship crews were brought by Russian icebreakers close to the North Pole to the 'POLARSTERN' for exchange. Even these approaches had a high risk of infection, which could only be eliminated by preceding fourteen-day quarantines. The constantly changing regulations, lockdowns and entry restrictions of the various countries confronted us with great organizational, logistical and also financial challenges.

Sometimes it was necessary to go unusual ways, so that our international scientists could travel back to their home countries at all, because air traffic was restricted or completely stopped worldwide. This meant that a folding bicycle had to be used to cross the border, or the scientists had to take the longest non-stop long-haul Lufthansa flight – more than 15 hours – to the ship to start their expedition to Antarctica.

Latest news in diving medicine

Daniela Koonen

University Hospital RWTH Aachen, Deptartment of Intensive Care and Intermediate Care, Aachen, Germany

What's new in the treatment of a diving accident? The international guidelines on diving accidents are now available as a completely revised version. The guideline structure in particular has been made more user-friendly, created under the leadership of the Society for Diving and Hyperbaric Medicine (GTÜM).

Established diagnostic and therapy methods are being confirmed, but there are a few important additions. The use of high-flow oxygen therapy, which has become established in the clinics, has been reintroduced. The new guideline now also provides detailed information on how children and young people are cared for after a iving accident and whether there are any differences to the treatment of adult patients.

Venomous snakes: A problem when travelling? A challenge to advice in travel-medicine

Christian Pechmann

Practice for General Medicine, Vellmar, Germany

About 2,700 species of snakes are known on Earth. One fifth of them are toxic. Except in the permafrost areas, there are poisonous snakes in all regions of the world. One should therefore also deal with this topic during a travel medical consultation. The topic of poisonous snakes is considered far too little in travel medicine and is insufficiently incorporated into travel medical consulting practice.

Every year, 138,000 people worldwide die from the bite of poisonous snakes. Most cases occur in Africa and India. Up to 400,000 people retain permanent damage (physical or psychological damage). The resulting injuries are significant and require complex medical treatment. When traveling mainly to tropical areas, poisonous snakes pose a significant health risk.

Systematics of poisonous snakes:

The poisonous snakes are divided into 4 large families.

- Viperidae,
- Elapudae,
- Colubridae,
- Atractaspididae.

There are also poisonous snakes in Europe. For example, the aspis viper, the sand otter and the known viper. All these snakes belong to the viperidae family and show the typical features of a viper: wide, three-shaped, flat head with clearly visible venom glands on the lateral head. In Europe, deaths from these snakes are very rare.

On all other continents there are highly toxic representatives of the poison beats, whose toxins sometimes have a highly complex effect as neurotoxins, as tissue scrotizing or influencing blood clotting. It must therefore be individually addressed according to destination country and travel rod on the local poisonous snakes.

Early onset of protection of the TAK-003 Dengue Vaccine

Eckhardt Petri[1], Shibadas Biswal[2], Eric Lloyd[2], Vianney Tricou[1], Nicolas Folschweiller[1]

1[1] Takeda Pharmaceuticals Inc., Zurich, Switzerland
2[2] Takeda Pharmaceuticals Inc., Cambridge, MA, USA

Background: The vaccination schedule of the tetravalent live attenuated dengue vaccine (TAK-003) consists of two doses administered 3 months apart and the phase 3 efficacy trial (NCT02747927) was conducted according to this schedule. An exploratory analysis was conducted to evaluate the level of protection observed before participants completed the vaccination schedule. This analysis was performed in participants in dengue endemic areas but could further inform vaccine use in travel settings.

Objective: Explore the early onset of protection induced by TAK-003 after the 1st dose and before the 2nd dose.

Method: Children and adolescents aged 4–16 years old were randomly assigned 2:1 to receive either two doses of TAK-003 or two doses of placebo, respectively, 3 months apart. The primary endpoint was overall vaccine efficacy (VE) in preventing virologically confirmed dengue (VCD) caused by any dengue virus (DENV) serotype. An exploratory analysis was performed to evaluate the VE of TAK-003 between the 1st and 2nd vaccine dose.

Results: Of the 20,071 participants who were given at least one dose of TAK-003 or placebo, 19,021 (94.8%) received both injections and were included in the per-protocol set (PPS) analysis. Within the 3 months between the 1st and 2nd vaccine dose, there were 34 participants with VCD in the placebo group vs. 13 participants in the TAK-003 group. In this exploratory analysis, the PPS VE of 81% (CI: 64.1–90.0) was comparable to the primary endpoint analysis for VE against VCD from 30 days up to 12 months post 2nd dose, which resulted in an efficacy of 80.2% (CI: 73.3–85.3) (Table 1).

Conclusion: TAK-003 provides early onset of protection against dengue after the 1st dose, which may benefit individuals who are exposed to dengue before completing the 2-dose vaccination schedule.

Table 1. VE against VCD in the PPS study population including exploratory data between the 1st and 2nd doses and primary endpoint data from 30 days post 2nd dose until 12 months post 2nd dose

	Participants with VCD in TAK-003 group, n	Participants with VCD in placebo group, n	VE against VCD, % (95% CI)
Exploratory analysis	13	34	81 (64.1–90.0)
Primary endpoint	61	149	80.2 (73.3–85.3)

CI, confidence interval; PPS, per-protocol set; VCD, virologically confirmed dengue;
VE, vaccine efficacy.

Funding: Takeda.

Malaria-update for travel medicine practitioners

Camilla Rothe

Hospital Centre of the LMU University Munich, Division of Infectious Diseases and Tropical Medicine, Munich, Germany

A rising number of 247 million malaria cases were reported worldwide in 2021.[1] In Germany, the number of imported malaria cases reached 768 in 2022 and was almost back to pre-pandemic levels. 98% of cases were imported from Sub-Sahara Africa. In Asia, a zoonotic species is gaining importance: *P. knowlesi*, which may cause severe malaria. Two-thirds of malaria cases imported from Thailand into Germany were caused by *P. knowlesi*.[2] The parasite is difficult to detect: RDTs tend to be negative and microscopically it can easily be missed.

Anopheles stephensi is a highly competent malaria vector. It differs from other anophelines in its ability to breed in small amounts of wastewater. *An. stephensi* is thereby optimally fit to survive in metropolitan areas. The recent rapid spread of *An. stephensi* in Africa combined with growing permethrine-resistance could contribute to a surge in urban malaria.[3-5]

Therapeutic gold standard for falciparum malaria are artemisinin combination therapies (ACTs). Recently, studies from several African countries reported a rise in *kelch-13* gene mutations of *P. falciparum* indicating developing ACT-resistance.[6] Even though clinical relevance is yet to be proven, this trend is alarming.

Two malaria vaccines are currently being used in vaccination campaigns for children in Africa: RTS,S/A021 (Mosquirix)[7] and R21.

Both vaccines are unsuitable for travel medicine as vaccine efficacy grossly lags behind the gold standard of antimalarial chemoprophylaxis. In contrast, monoclonal antibodies against *P. falciaparum* yield promising results in human challenge studies showing protection rates of 100% eight weeks after subcutaneous application.[8]

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International support mechanisms in medical disasters

Johannes S. Schad

German Institute for Disaster and Emergency Medicine, Tübingen, Germany

The painful lessons learned from previous major disasters resulted in significant quality improvement of the providing international aid agencies. The SPHERE standard, the Emergency Medical Team (EMT) and UN-Health-Cluster approach, the Interagency Emergency Health Kit (IEHK) or the EU-protection-mechanism, etc. have been milestones of improvements to ensure the quality reached for those in acute needs.

However, even so the numbers of national organisations were raising in numbers and funding capacities, it turned out, that still to date, humanitarian aid is linked to political decision making processes by states and not simply needs-driven. The acceptance of external support is often perceived as compromising the affected states' sovereignty due to the lack of own response capacities. This results often in a relevant delay of humanitarian aid and can cause serious harm to affected people.

For international aid workers the access to disaster areas remain to be an ongoing challenge: Not only the collapse of road, air or sea transportation systems cause delays, but also the exploding prices and lack of sufficient information are particular challenges for e.g. assessment-teams. In addition, in-country professional accreditation, registration requirements, medical working permits and other formal obstacles, line out the importance to collaborate with national and local agencies.

For the global Red Cross Red Crescent movement the establishment of standard operating procedures for its Emergency Response Units (ERU) has been a big improvement to support affected national Red Cross societies.

First aid for accidents in, under and on the water

Stefan Schröder

Hospital Düren gem. GmbH – Clinic for Anaesthesiology, Tutzing; Klinik für Anästhesiologie der Krankenhaus Düren gem. GmbH, Germany

Accidents on and in the water represent a particular challenge, since the theoretical knowledge and personal experience are rather low due to the small absolute number of incidents. With this it is important to ensure the own protection and not exposing to an unnecessarily increased risk. Diving is enjoying increasing popularity. Diving accidents are essentially based on the change in the ambient pressure affecting the human organism. In this context after successful rescue, administration of oxygen with the highest possible inspiratory concentration as fast as possible is the most important immediate measure. Water accidents are often associated with drowning. Drowning is a completed process, namely death as a result of suffocation after immersion in liquids. The main goal of emergency therapy in drowning accidents is the rapid elimination of hypoxemia. After accidents in shallow water and on sailing boats injuries to the cervical spine must also be considered. In addition, accidents around the water are associated with hypothermia. The primary goal is isolation to protect against further hypothermia as well as the shortest possible preclinical time. In conclusion, the aim for high quality treatment of accident victims on and in the water is to build networks for the exchange of knowledge and experience as well as joint training for all rescuers involved in the care.

Antimicobial resistance using the example of Ghana

Miriam Stegemann

Charité – University Medicine Berlin, Institute for Hygiene and Environmental Medicine, Berlin, Germany