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CARDIOPULSE

The European Association of Preventive Cardiology Aviation and Occupational Cardiology Task Force

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The role of the cardiologist in assessing individuals who undertake high-hazard occupations is increasingly complex. It requires a detailed understanding of all aspects of cardiology and also of the occupational environment in which people with cardiovascular risk or cardiovascular patients work (i.e. the hypobaric and hypoxic environment for aircrew, hyperbaric for divers, or the remote arctic environment for polar workers). The cardiologist should be aware of the (often legally binding) rules and regulations that certain occupations operate to, and of the potential effects and consequences of clinical cardiology management (whether intervention or pharmacotherapy) in meeting these legislative requirements (*Figures 1 and 2*).

As outlined previously in this journal, because of routine screening cardiovascular risk or disease may be identified earlier (in terms of age, and disease process) in many occupational groups compared with the usual clinical cohorts seen by general practitioners cardiologists in routine practice.[1,2] Specific requirements for investigation may be more stringent and extensive than usual, focusing on the risk assessment and prediction of symptoms that may lead to occupationally relevant distraction or incapacitation. In doubt, medical assessment is sometimes even exceeding current guideline recommendations to exclude underlying disease, e.g. coronary heart disease. Consideration of both clinical and occupational requirements for these individuals may lead to differing clinical management, whether medical or surgical,[3] being most appropriate, with closer follow-up, often over a longer duration, and against potentially stringent legal requirements. This includes both primary and secondary prevention, with return to work after an myocardial infarction, or other cardiovascular illness, often requiring a different approach due to the acceptable threshold of risk, for example whether for smoking cessation, or exercise requirements for known cardiovascular disease patients. The occupational risk assessment is necessary to prevent harm to the individual and those closely connected to the individual's occupational tasks, e.g. pilot, but also society at large, and therefore is firmly placed in the preventative cardiology sphere.

To that end, the European Association of Preventive Cardiology (EAPC), a branch of the European Society of Cardiology (ESC) has set up a new Task Force to specifically explore both occupational and aviation cardiology. The group is directed to provide an expert task force on aviation cardiology initially (as this is where some evidence already exists, albeit mostly in previous consensus documents), developing a strategy for educational material, guideline support, and an expert point of contact for cardiologists, aviation medical examiners, and regulators and then to expand to wider occupational groups (such as high-hazard occupations, professional drivers, divers, and climbers).

Aviation Cardiology requires expert knowledge of the principles of aviation medicine, flight physiology, air safety regulations, and aircraft/aircrew types. At present, Aviation Cardiology is not represented within one of the ESC associations, nor the EAPC. Due to the wide and diverse knowledge required, which other cardiological disciplines do not have, Aviation Cardiology is being considered as a sub-discipline within EAPC, with which Aviation Medicine has most overlapping fields.[4] Extension into other high-hazard occupations (other transport modalities, emergency services, divers, mountaineers, oil-rig workers, etc.) will be addressed and clearly widen the appeal. As risk assessment and sports cardiology have overlapping interests,[5] e.g. indication for cardiovascular imaging or exercise during hypoxia, in health and disease, Aviation Cardiology will easily be integrated in EACP activities, e.g. congress or education.

The Task Force aims to become a valued provider of expert Aviation and Occupational Cardiology advice and will seek to work with the wider aviation/occupational medicine community in Europe, building on the expert work of the ESC and EAPC in other fields. This will include developing educational material for general cardiologists and cardiothoracic surgeons that highlights the requirements (and potential pitfalls) that may be faced in the process of cardiovascular risk evaluation of pilots, non-pilot aircrew (patients and non-patients), and passengers. Underpinning this is a need to understand the characteristics of different types of air transport and other aviation activities (i.e. commercial aircraft, high performance fast jets, light aircraft, gliders, balloons, and parachutists) and the specific environmental factors that need to be understood. In due course these principles, employed in

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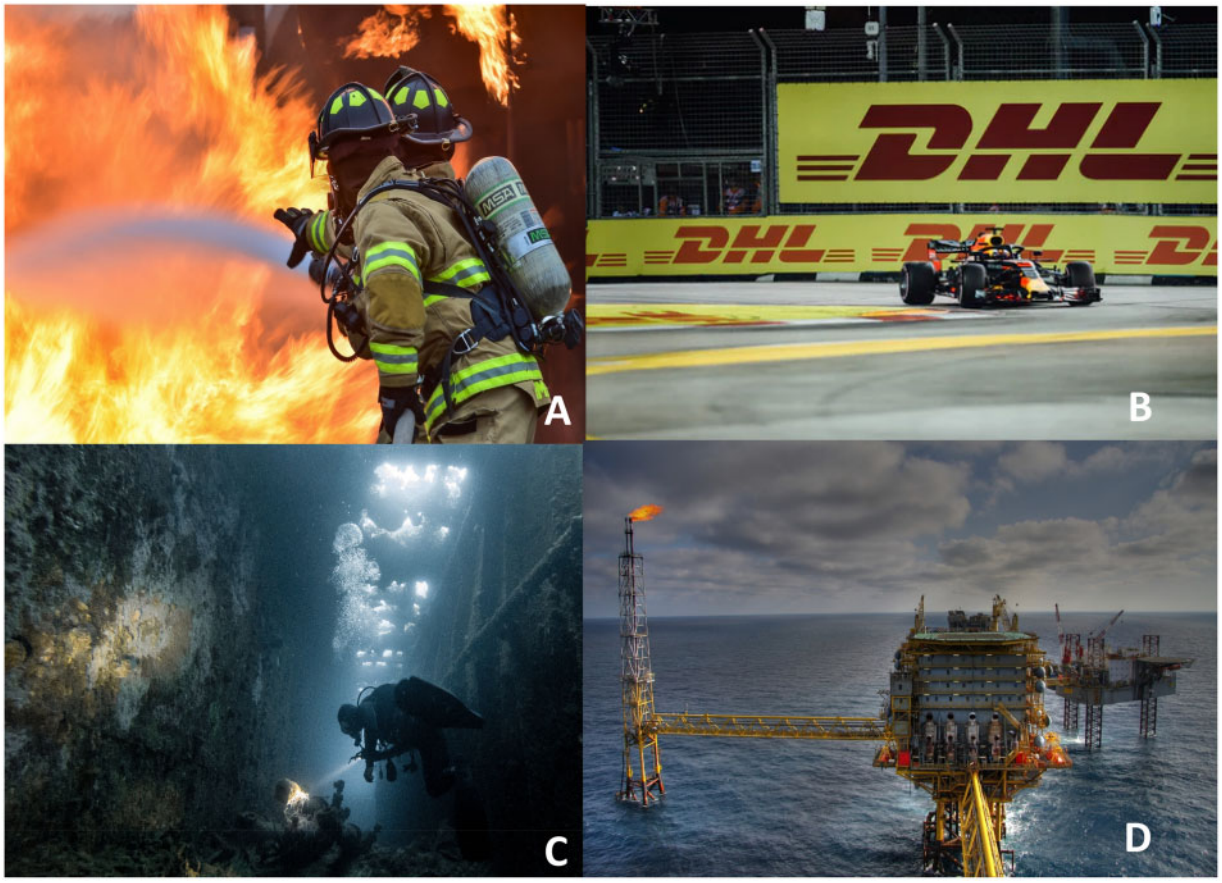

Figure 1 Occupations that may require employment restrictions to mitigate risk include those which require operating in an extreme environment such as (*A*) firefighters (thermal stress, use of breathing systems, intermittent high physical workload), (*B*) professional motor racing (thermal stress and acceleration forces), and (*C*) professional divers in a hyperbaric environment, or risks inherent to the remote work location, such as (*D*) offshore oil-rig workers (limited access to healthcare facilities, especially if helicopter evacuation is hampered by adverse weather conditions).

Aviation Cardiology, will be modified to inform the wider occupational assessment of cardiovascular disease in other high-hazard occupations and/or recreational pastimes.

The current scientific level on which Aviation/Occupational Cardiology is based is rather weak compared to other aspects of cardiology and the Task Force will seek to develop (as far as possible) evidence-based guidance for Aviation and other employment regulations, by bringing together a community of experts with an interest in this field, building research links and clinical collaboration across the ESC community. The Task Force aims to bring together different groups and organizations in which Aviation Cardiology is involved [i.e. by liaising with representatives from groups such as, but not limited to, the European Association of Cardiothoracic Surgeons Aviation Cardiology working group (WG), the North Atlantic Treaty Organisation Aviation Cardiology WG, the European Aviation Safety Agency (EASA), UK Civil Aviation Authorities, European Society of Aerospace Medicine, and others].

Over time the Task Force aims to become the competent specialist advisory group on Aviation Cardiology (within EAPC), which the aeromedical regulators (such as EASA) can turn to for expert advice prior to updating their regulations, extending into occupational cardiology over time. The Task Force will look to identify, co-ordinate, and promote research activity where issues of Aviation/Occupational Cardiology are involved, e.g. in the wider field of aerospace medicine and high-hazard occupations or environments. It will also aim to publish position statements related to these unique and specific topics under the guidance and auspices of the EAPC.

Aviation and Occupational Cardiology is, at its core, preventative cardiology (to reduce/mitigate the risk of cardiovascular and aviation/workplace events) with complex multi-dimensional challenges (that include cardiovascular pathology, the flight/work environment, and legislation). Aviation shares several characteristics with other high-hazard occupations that require similar risk assessments and use similar prevention principles. The new Task Force will provide a strategy and organizational structure that delivers a respected Aviation/Occupational Cardiology group within EAPC that provides training, education, personnel, guidelines and clinical advice to general practitioners, sports medicine or occupational medicine specialists, cardiologists and cardiothoracic surgeons, aviation medical examiners, regulatory authorities, and other stakeholders in the wider occupational medicine fields. It will support the wider EAPC and ESC initiatives, such as congresses, meetings, support to guideline development, and in time seek to become the expert group of choice for regulatory authorities. It will in time extend these activities to other high-hazard occupations (other

Figure 2 Special cardiovascular considerations (and legislation) are required for pilots and other aircrew, such as (*A*) single seat fast jet pilots (sustained acceleration; G Forces, potential hypoxia, hypobaria and positive pressure breathing, in additional to mission stressors). For high performance aircrew cardiovascular assessment may include investigation in a high-Gs centrifuge (*B* and *C*), which causes significant stressors on the cardiovascular system as demonstrated in (*D*), which shows chest radiographs of a chimpanzee undergoing centrifuge testing at +1, +2, +4, and +6 Gz; mediastinal elongation with topographic changes (Fischer U. Der Kreislaf unter Beschleunigung. Roentgenaufnahmen beim Affen. *Luftfahtmedizin* 1937; 2:1–13).

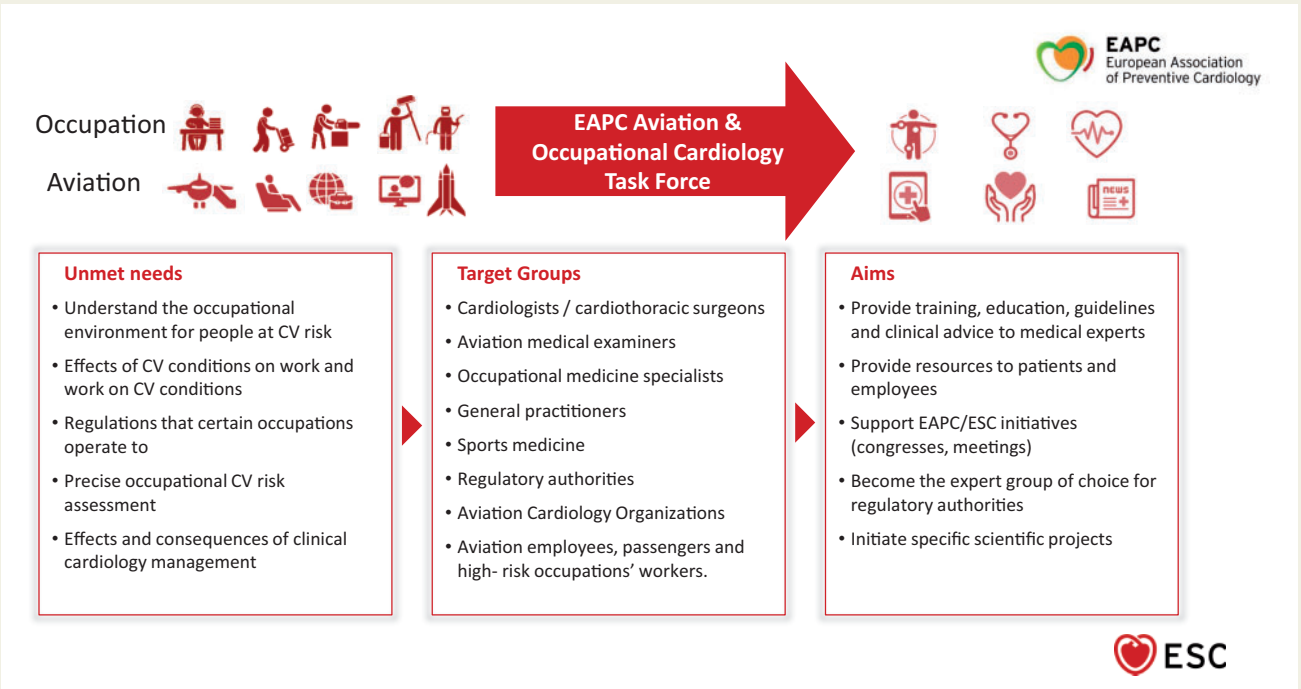

Figure 3 The EAPC Aviation and Occupational Cardiology Task Force.

transport modalities, emergency services, divers, mountaineers, oil-rig workers, etc.) (*Figure 3*).

The Task Force seeks to appeal to all cardiologists and to other medical doctors (non-cardiologist), who are currently, or who may be involved in the clinical management of aircrew, passengers, or other occupational groups. It may also become a focal point for expert advice and resources for pilots, non-pilot aircrew (patients and non-patients), and passengers and patients in other occupations where cardiovascular risk evaluation in relation with their profession is required. If you have a specific interest in this field and would like to engage further with the Task Force in developing this work please contact the EAPC Team at eapc@escardio.org.

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TeleHealth in the digital revolution era

Insights from Twitter are discussed, that may assist in the delivery of health care including cardiology

Novel research tools for the digital revolution

Novel analyses of social media (e.g., Twitter) data have been used for public health research. Twitter analyses have demonstrated positive and negative insights into health research. We previously performed Twitter analyses and described the methodology in detail elsewhere.[1,2] In our previous study, we found that tweets related to the COVID-19 pandemic in non-academic users largely contain unverifiable and unproven information.[2] For example, in Tweets related to COVID-19 among non-academic users, we found significant amounts of misinformation such as the relationship between influenza infection and COVID-19, the influenza vaccine association with a positive COVID-19 test, and the 5G network COVID-19 conspiracy theory. These findings serve as evidence of the spread of misinformation and unverifiable information among non-academic Twitter users which may serve as a surrogate marker of public perceptions at large.

Although some Twitter activity may circumvent the efforts of public health officials to establish evidence-based principles to combat the COVID-19 pandemic, other Twitter data may help officials identify important information regarding COVID-19 infection. For example, in another study from our group, we were able to identify novel COVID-19 symptoms such as psychiatric symptoms, rash, toe symptoms, conjunctivitis, or numbness among non-healthcare professional users.[1] However, this study has limitations from significant biases related to data obtained from Tweets rather than official medical records or a verified registry.

Notwithstanding, our studies demonstrate that Twitter data analysis techniques may provide a means of assessing public health perceptions among non-healthcare professional or non-academic Twitter users in healthcare systems. Information gleaned from Twitter data analysis could potentially aid public health officials in developing communication strategies to combat potentially dangerous misconceptions and misinformation among the general population.

TeleHealth: *insights from twitter*

From 2010 to 2017, the utilization rate of telehealth has been rapidly increasing,[3] and the COVID-19 pandemic has accelerated the shift towards the first digital revolution (the proliferation of digital platforms in our modern economy). Additionally, many health systems are shifting towards hybrid healthcare delivery models which balance between in-person visit and virtual visit. In our preliminary analysis, we sought to identify opinions from non-healthcare professional Twitter users related to telehealth. After extensive systematic analyses which included thousands of Tweets, we identified both positive and negative sentiments from non-healthcare professional users related to the telehealth experience.

Positive perceptions for example, included safety (e.g., prevention of COVID-19 transmissions), convenience (e.g., a reduced need for public transportation), mental health benefits (e.g., telehealth for psychotherapy), and environmental benefits. Telehealth systems appear to be very safe given the COVID-19 pandemic because it prevents transmissions and maintains social distancing guidelines. One downside of these platforms is a lack of in-person physical examination; however, emerging technologies such as wearable technology could bridge this gap.

Every pandemic has the potential to cause significant mental health issues. One meta-analysis found that depressed mood, anxiety, impaired memory, and insomnia were present in 33–42% of patients admitted to the hospital for severe acute respiratory syndrome (SARS) or Middle East respiratory syndrome (MERS).[4] Thus, mental healthcare delivery is crucial during the current COVID-19 pandemic and social distancing era. Additionally, the effects of COVID-19 deaths on mental health and our society will be profound. In our preliminary analysis, we found that numerous tweets considered tele mental health care (online mental health care such as telepsychotherapy or telepsychiatry) as beneficial for their mental health during pandemics. A systematic review of 156 articles concluded that telemental health care is cost effective and can lead to promising outcomes.[5]