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GETTING TO THE HEART OF TACHYCARDIA AMONG FOREIGN WORKERS WITH COVID-19 IN DORMITORIES

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PATIENT'S REVELATION: WHAT HAPPENED?

Routine monitoring of heart rate is an integral part of the daily assessment for the patients with Coronavirus Disease 2019 (COVID-19). This systematic documentation of heart rate allows for the timely identification of patients with worsening clinical conditions to minimise delay in the institution of life-saving measures. However, without the aid of a bevy of sophisticated diagnostic aids in the austere setting of a medical outpost, it is incumbent on clinicians working in dormitories to develop an approach that balance the need of managing patients with tachycardia safely in an outpatient dormitory setting vis-a-vis the need to avoid overburdening healthcare resource in the hospitals. The holistic approach to managing this unique group of patients involves understanding the current literature regarding the cardiovascular system and COVID-19 and implementing a diagnostic model that consists of information gathering and clinical reasoning.

GAINING INSIGHT: WHAT ARE THE ISSUES?

Part of Singapore's strategy towards the effective containment of the community spread of COVID-19 involves the identification and isolation of foreign workers with COVID-19 in community care facilities where the worker's welfare and medical needs are promptly attended to. Healthcare professionals deployed to such facilities are required to provide routine outpatient medical care to the foreign workers and to assist in the timely evacuation of medically unstable patients who develop complications from COVID-19. Central to the objective assessment of the hemodynamic stability of patients with COVID-19 involves the regular monitoring of a patient's heart rate. It has been observed during the author's deployment in a dormitory that many foreign workers with COVID-19 exhibited signs of tachycardia. Many of these patients are flagged out at triage during the daily routine review, which acts as a safeguard for early identification of sick patients who potentially require escalation of care.

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Challenges complicating the management of such patients include nascent literature on the coronavirus pandemic, a linguistic divide and making the best use of rudimentary medical devices such as the stethoscope, sphygmomanometer and pulse oximetry in the absence of sophisticated diagnostic tools such as electrocardiogram, chest radiograph and blood test. Furthermore, the difficulty of managing tachycardia is compounded by confounding variables unique to this group of patient demographic. This includes the pervasive tachycardia-inducing anxiety over the health and financial ramifications of contracting COVID-19, the heat exhaustion from the warm and humid environment and inadequate hydration secondary to fasting for Ramadan in a subset of the foreign workers' population.

STUDY THE MANAGEMENT: HOW DO WE APPLY IN OUR CLINICAL PRACTICE?

LITERATURE REVIEW ON THE CARDIOVASCULAR SYSTEM AND COVID-19

Recent studies had demonstrated the association between COVID-19 and its cardiovascular complications. In a study on 191 patients in Wuhan, China, it has been observed that COVID-19 has the potential to cause cardiac injury with 17 percent of the patients noted to have elevated troponin and 23 percent to have heart failure.[1] In another study of 136 patients in Wuhan, 7.3 percent had experienced palpitations and presented cardiovascular symptoms to the clinician.[2] The cardiovascular complications manifested by patients with COVID-19 is not isolated to patients in China. A study of a population of 99 patients with COVID-19 pneumonia in Northern Italy demonstrated that cardiac patients have an extremely poor prognosis compared with subjects without a history of cardiac disease with higher mortality (36 percent vs 15 percent), thromboembolic events (23 percent vs 6 percent) and septic shock (11 percent vs 0 percent) rates.[3] In another recent study in New York, cardiac arrhythmias observed in patients with COVID-19 infection included high-grade atrioventricular block, atrial fibrillation and polymorphic ventricular tachycardia.[4] It was also highlighted in the paper that clinicians need to keep in mind potential pro-arrhythmic effects of antimalarial and antibiotics therapies. Currently, proposed mechanisms of myocardial injury include that of ACE2-related signalling pathways and a cytokine storm triggered by an imbalanced response by type 1 and type 2 T-helper cells.[5] These studies have elucidated the need to be vigilant of cardiac complications when managing patients with COVID-19.

Murtagh's diagnostic model of five self-posed questions is a useful guide to approaching tachycardia in patients with COVID-19. These questions will help to find out the probable diagnosis, serious disorder not to miss, pitfalls, masquerades and yellow flags.[6] While dehydration and drugs such as chlorpheniramine are common reversible causes of tachycardia, other serious COVID-related complications should be

considered. In a study on 138 hospitalised patients with COVID-19 in Wuhan, 8.7 percent had shock, 7.2 percent had an acute cardiac injury, 16.7 percent had arrhythmia, 19.6 percent had acute respiratory distress, and 3.6 percent had acute kidney injury.[7] In addition, pitfalls such as mitral valve disease, aortic incompetence and pheochromocytoma should be avoided. Masquerades of tachycardia include depression, anaemia, thyroid disorder, drugs, spinal dysfunction and urinary tract infection. Last but not least, cardiac neurosis and anxiety are potential yellow flags that should not be forgotten.

For COVID-19 patients presenting with tachycardia, it is important to check for other clinical indicators of sepsis in the Systemic Inflammatory Response (SIRS) criteria which involves namely temperature less than 36 Degree Celsius or more than 38 Degree Celsius, heart rate more than 90 per minute, a respiratory rate more than 20 per minute. If the patient is diagnosed to have pneumonia, a useful risk stratifying tool is the CRB-65 score which involves assessment of confusion, respiratory rate, blood pressure and age.[8]

OVERVIEW OF THE DIAGNOSTIC PROCESS IN THE MANAGEMENT OF PATIENTS WITH COVID-19 WITH TACHYCARDIA

The diagnostic process has been described as a complex, patient-centred, collaborative activity that rests on the twin pillars of information gathering and clinical reasoning with the goal of attaining a correct understanding of the patient's health problem.[9]

The full spectrum of information gathering activities afforded by a modern medical facility would ideally include clinical history, physical examination, diagnostic testing and consulting with other clinicians. In an unfamiliar setting of a medical outpost without advanced diagnostic capabilities, information gathering approaches employed have to be refined such that more emphasis is placed on the clinical history and physical examination in hypothesis generation and the calculation of diagnostic probabilities.

Pertaining to the process of history taking, the words of the revered Professor William Osler's "Just listen to your patient, he is telling you the diagnosis" still ring true today.[10] Patient's reason for encounter, ideas, concerns and expectations, red flags, past medical history, drug history, and social history should be thoroughly elicited during the patient-clinician encounter with the consideration of the differential diagnosis listed during the review of the current medical literature. An important consideration during communication with diverse populations are that language, health literacy, and cultural barriers can influence the patient-clinician encounter.[11] This was mitigated in the dormitories with the utilisation of patient information aids with symptoms clearly depicted in pictographs to reduce information lost in translation. In an integrative review of the use of picture-based health education materials for persons with low health literacy, it was demonstrated that pictographic educations materials have a positive effect on health self-management regardless of race/ethnicity and country of origin.[12] This is in line with Mayer's cognitive theory of multimedia learning where learners can improve their learning abilities when presented with pictures as well as words based on the principle that people process information through auditory and visual channels whereby each channel has a limited amount of memory.[13]

A carefully conducted physical examination is instrumental in preventing unnecessary diagnostic testing and direct the next steps in the diagnostic process.[14] For patients in whom tachycardia was detected through pulse oximetry, heart rate should be rechecked manually to ensure reproducibility and persistence of the tachycardia. Inaccuracies can be further reduced by ensuring patients avoid caffeine and strenuous activities before their pulse rate are measured. Other vital signs such as temperature, respiratory rate and blood pressure should be documented as well with the pulse assessed for its regularity, character and volume. A thorough cardiovascular, thyroid and respiratory examination should be performed.

It is imperative to bear in mind that diagnostic certainty need not be a prerequisite to initiating treatment, and the goal should be reducing diagnostic uncertainty enough to make optimal decisions.[15] By assessing patients' response to treatment, empirical treatment strategies can minimise the use of inappropriate, invasive diagnostic testing and serve as a valuable part of the information gathering process. In the context of patients with tachycardia, a positive response to a trial of fluid resuscitation provides vital information which allows further refinement of the working diagnosis.

In addition to a robust information gathering process, proficiency in clinical reasoning is also pivotal in reducing diagnostics errors. Clinical reasoning, according to the dual-process theory employs a slow system of conscious, deliberate process guided by critical thinking as well as a fast system of unconscious, intuitive and automatic pattern recognition[16]. During clinical reasoning, it is of paramount importance to be aware of different cognitive biases that influence decision making such as anchoring, affective bias, availability bias, context errors, search satisficing and the principles of probabilistic reasoning.[9]

CONCLUSION

The approach to tachycardia among foreign workers with COVID-19 reminds clinicians of the importance of a diagnostic process which rests on the foundation of proficient information gathering and sharp clinical reasoning skills.

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