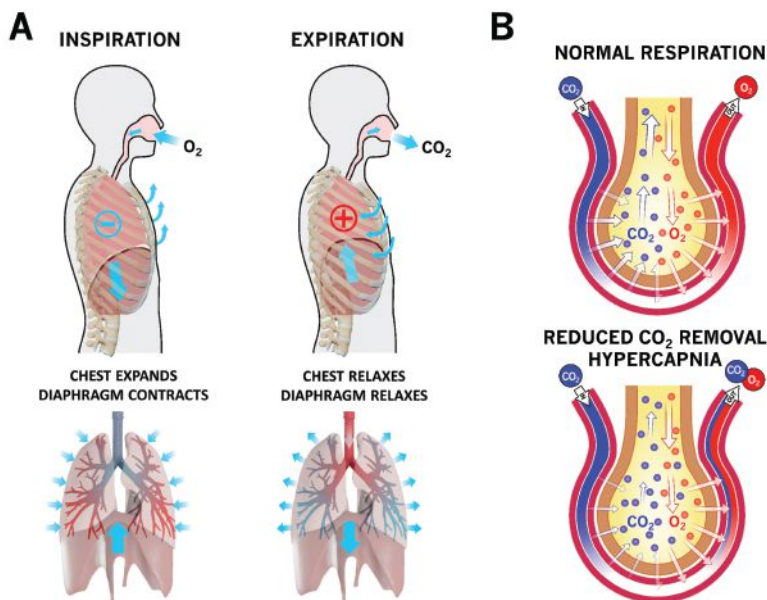


Hidden dangers

Prone restraint and positional asphyxia in custody deaths

By Geoffrey Desmoulin



In custody deaths of subjects restrained in the prone position are coming under increased scrutiny. Unlike the well-publicized George Floyd case where breathing was restricted due to pressure applied to the neck (described by Dr. Martin Tobin at the Chauvin trial), deaths have resulted when subjects are placed in handcuffs in the prone position

with weight applied to the back. In the past, such deaths have often been ascribed to “excited delirium”, a now-debunked classification of death.¹ Rather, it has been recognized that these deaths have resulted from restricted breathing and are, more correctly, designated as positional asphyxia. While the duty to restrain a combative assailant may remain a priority, law

enforcement must recognize the signs of positional asphyxia to take timely countermeasures to ensure the safety of detainees.

Although some studies² have suggested that subjects handcuffed in the prone position can breathe adequately, these studies have been conducted on healthy, fit subjects and fail to account for the effect of the subject’s physique, physical exertion,

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or emotional state, on respiration.

Respiration consists of two phases: inspiration, during which atmospheric air enters the lungs, and expiration, during which air from the lungs is returned to the atmosphere. Gas exchange in the lungs allows O₂ to enter the blood and CO₂ to be removed from the blood. The removal of CO₂ is equally, if not more, important to the entry of O₂. Too little O₂ in the blood can lead to a state of hypoxia and loss of consciousness, whereas too much CO₂ in the blood can lead to a state of hypercapnia, metabolic acidosis and cardiac arrest.

The prone position by itself, without restraint, significantly increases the work that muscles must perform during inspiration. Inspiration required 70 per cent more work while resting prone in water compared to sitting in air.³ Breathing, while prone on a hard surface, requires that the inspiratory muscles raise the mass of the torso, as well as any load on the back, in order to expand the chest. The greater the body weight and the greater the weight pushing down, the more work that they must perform. The more work, the more

CO₂ the muscles produce and the higher the concentration of CO₂ in the blood.

Furthermore, in the prone position, the amount of air that can move in and out of the lungs is reduced because body weight and weight on the back compress the chest, reducing the volume of the thoracic cavity.⁴

Obesity can contribute to increased accumulation of CO₂ in the blood. The abdomen is compressed in the prone position which means that the diaphragm must do even more work during inspiration to overcome increased intra-abdominal pressure than in a standing or seated position.

Emotional distress and physical struggle will increase heart rate and blood pressure, both of which increase metabolism, requiring more O₂ and producing more CO₂. Furthermore, struggling increases O₂ demand and CO₂ production in the same way as exercise. What may not be obvious is that struggling is frequently a sign that the subject is trying to move the body into a position where breathing is less difficult as CO₂ concentration in the blood increases to the point of metabolic acidosis as opposed to an attempt to escape custody. This

increase in struggle may be interpreted by police as increased resistance to being restrained and in turn police may increase restraining effort, exacerbating the issue.

Substance use can also contribute to the accumulation of CO₂ in the blood. Opioids can depress respiration, reducing the volume of air moving in and out of the lungs.⁵ Methamphetamine increases heart rate and reduces the capacity of the cardiovascular system to appropriately respond to increased levels of CO₂ in the blood.⁶

Even two minutes in the prone position, while restrained, can compromise breathing to the point of positional asphyxia. The only sure way to reduce the risk is to move the subject from the prone position to a position where the chest is no longer compressed as quickly as possible after restraints have been successfully applied. ■

For a full list of references, please visit www.blueline.ca/Hidden-dangers-prone-restraint-and-positional-asphyxia-in-custody-deaths/.

Geoffrey T. Desmoulin, PhD., RKin., PLEng., is the Principal of GTD Scientific Inc. in North Vancouver. He can be reached at gtdesmoulin@gtdscientific.com.



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