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This brief is one in a series of non-technical articles that discuss bystander delivery of oxygen during breathing emergencies

Ground-breaking Inventions in Respiratory Medicine

Medical innovations have saved countless lives over the years from the first stethoscope in 1816 to enhance the sound of a heartbeat to today's modern MRI machines that can non-invasively seek out disease deep inside of our bodies.[i] Within this long timeline of development are many inventions that are specific to lung health, helping diagnose and treat medical problems that might otherwise lead to death.

Stethoscope

As noted above, the stethoscope is one of the earliest innovations for medical care and continues to be used by physicians today. Common stethoscopes focus the sounds from the cone that the physician places on your body through the hollow tubes that end at the physician's earpiece. More advanced versions of the stethoscope use electronics to further amplify the sound and remove noise.

When your physician applies a stethoscope to your chest and asks you to take in deep breaths, she's listening for sounds like crackles and wheezes that may indicate possible problems and the need for further testing.

Spirometer

Depending on an initial lung evaluation by your physician, he may order tests that help determine if your lungs are functioning properly. One such test instrument, a spirometer, measures the amount of air you can forcefully blow out after a deep breath, and the speed of your exhalation. Different kinds of lung problems – like asthma and COPD – can reduce both the amount and speed of your exhaled air.

Exhaled Nitric Oxide (NO) Breath Analysis

Nitric Oxide is a gas that naturally occurs in our bodies and which we exhale with each breath. Like blood pressure and weight, unusually high levels of nitric oxide could indicate unseen conditions in your lung like inflammation. Because inflammation can accompany asthma, early detection of high nitric oxygen levels may suggest the possibility of an asthma attack.

If you or your loved ones are diagnosed with asthma, then your physician may conduct breath analysis to ascertain the level of nitric oxide and modify treatment accordingly in order to help avoid a potentially dangerous asthma attack

Ex Vivo Lung Perfusion

In extreme cases of disease when a person's lung fails it must be replaced with a functioning lung from a donor. For many reasons, these kinds of transplants are not performed simultaneously directly from donor to recipient but in stages to help ensure the success of the extraordinary transplant surgery.

Ex vivo is a Latin term for "out of the living" and refers to a medical procedure like a lung transplant where a functioning lung is removed from the body. Ex vivo lung perfusion (EVLP) is a process where the donor's lungs "are placed inside a sterile plastic dome attached to a ventilator, pump, and filters." [ii] The lungs are maintained in this environment until they can be transplanted, giving the recipient a new lease on life.

Public Access Emergency Oxygen

Lung problems can develop over years due to exposure to materials like cigarette smoke or because of a person's natural disposition to a chronic disease like asthma. Lung problems can also have a very rapid onset for a brief period, brought on by events from dehydration to cardiac arrest.

In cases where lung problems lead to a breathing emergency, the immediate administration of oxygen can remove the victim's distress and may also defend against long-term injury or save the victim's life. Until recently, only those with special training could deliver oxygen to a person during a breathing emergency. Further, only cylinders of compressed oxygen were available for this purpose and those cylinders had to be keep out of public access due to potential danger of explosion.

The R15 portable emergency device is the latest ground-breaking invention in respiratory medicine. Cleared by the Food and Drug Administration (FDA) for use in public places, the R15 device may be used by anyone without any special training. In three simple steps, any bystander can help another person who is experiencing a breathing emergency with oxygen until an ambulance arrives on the scene.

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[i] The Earliest Medical Device Innovators, Chris Newmarker, Brian Buntz, Medical Device and Diagnostic Industry [online 6May19> https://www.mddionline.com/earliest-medical-device-innovators
[ii] Ex vivo lung perfusion, Tiago N. Machuca, Marcelo Cypel, J Thorac Dis. 2014 Aug; 6(8): 1054–1062 [online 4May19> https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4133548/