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The findings suggest that even at extremes of altitude, oxygen concentrators are a safe alternative to compressed or	Task Description:	 1) Original Aims The management of major illness and/or trauma in space, will likely result in the need for delivery of oxygen. On orbit delivery of oxygen relies on oxygen stores which also provide environmental oxygen. A major concern of oxygen delivery is the elevation of ambient oxygen concentration and increased risk of fire. Our previous work has found that in previously healthy individuals (similar to NASA astronaus) oxygen requirements can be met by oxygen at 3-4 liters per minute. This finding suggests that oxygen on-orbit could be provided by a oxygen concentrator. This device has the advantage of operating solely from electric power and since it concentrates oxygen from ambient air, does not result increases in environmental oxygen concentration reducing fire risk. The waste gas from a concentrator is nitrogen, resulting in a net environmental change of 0. Oxygen concentrators are used in home applications for patients with chronic lung disease and other respiratory disorders. We propose to evaluate the SeQual Eclipse and SeQual Integra oxygen concentrators at in an altitude chamber up to 30,000 feet. The investigators all have certifications for altitude chamber use and we will use the chamber at Brooks Air Force Base in San Antonio, TX. 2) Key Findings We evaluated currently on the shelf portable concentrators Results of the testing demonstrated the following important findings o The volume of oxygen produced per minute varied from 0.5 to 3.0 liters o As respiratory rate increases concentrator performance follows one of three characteristics o Oxygen concentration remains constant, but only every other breath is rewarded with oxygen (the net effect being less oxygen to the patient) o Oxygen concentration frem as constant, but only every other breath is rewarded with oxygen (Respironics EverGo) The Edipse II failed to operate above 22000 ft. Power consumption was reduced at higher altitudes. At the highest flow
Rationale for HRP Directed Research:	Research Impact/Earth Benefits:	Oxygen concentrators are capable of providing oxygen whenever electricity is available. Oxygen concentrators can be used instead of compressed oxygen in cylinders or liquid oxygen in a number of scenarios where transport of oxygen is hazardous or logistically challenging. This work supports the use of oxygen concentrators in far forward situations, in the back of aircraft, in extreme environments (climbing to altitude), and in emergency and mass casualty situations. This work has initiated new research into combining an oxygen concentrator with a ventilator for military and mass casualty operations. The use of concentrators in ground ambulances in the current conflict in the Middle East has been spurred by the success of this project.
Rationale for HRP Directed Research:Research Impact/Earth Benefits:Oxygen concentrators are capable of providing oxygen whenever electricity is available. Oxygen concentrators can be used instead of compressed oxygen in cylinders or liquid oxygen in a number of scenarios where transport of oxygen is hazardous or logistically challenging. This work supports the use of oxygen concentrators in far forward situations, in the back of aircraft, in extreme environments (climbing to altitude), and in emergency and mass casualty situations. This work has initiated new research into combining an oxygen concentrator with a ventilator for military and mass casualty operations. The use of concentrators in ground ambulances in the current conflict in the Middle East has been spurred by the success of this project.	Task Progress:	The project completed all proposed tasks. COTS concentrators will evaluated to identify the device capable of oxygen delivery of at least 3 L.min. An instrument to monitor oxygen concentration, flow, and volume at altitude was fabricated and tested. Two oxygen concentrators were tested at altitude.
Rationale for HRP Directed Research: Oxygen concentrators are capable of providing oxygen whenever electricity is available. Oxygen concentrators can be used instead of compressed oxygen in cylinders or liquid oxygen in a number of scenarios where transport of oxygen is hazardous or logistically challenging. This work supports the use of oxygen concentrators in far forward situations, in the back of aircraft, in extreme environments (climbing to altitude), and in emergency and mass casualty situations. This work has initiated new research into combining an oxygen concentrator with a ventilator for military and mass casualty operations. The use of concentrators in ground ambulances in the current conflict in the Middle East has been spured by the success of this project. Task Progress: The project completed all proposed tasks. Two oxygen concentrators will evaluated to identify the device capable of oxygen delivery of at least 3 L.min.		Results are to be presented at the ATACCC meeting in August and papers published in the Journal of Trauma in 2010.
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Papers from Meeting Proceedings	Rodriquez D, Johannigman JA, Dorlac W, Branson RD. "Evaluation of concentrators at altitude." Advanced Technology for Combat Casualty Care Conference, St. Pete Beach, FL, August 10-12, 2009. Advanced Technology for Combat Casualty Care Conference. In press, 2009. , Jun-2009
Papers from Meeting Proceedings	Rodriquez D, Johannigman JA, Dorlac W, Branson RD. "Maximizing oxygen delivery with a concentrator during mechanical ventilation." Advanced Technology for Combat Casualty Care Conference, St. Pete Beach, FL, August 10-12, 2009. Advanced Technology for Combat Casualty Care Conference. In press, 2009. , Jun-2009