

Aerosol Drug Delivery through Continuous Positive Airway Pressure (CPAP) Device

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Patrick Kurkiewicz, leader

Annie Loevinger, communicator

Joe Decker, BSAC

Steve Welch, BWIG

Product Design Specifications

Function

To automatically deliver aerosolized drugs during use of CPAP device without compromising the function of the CPAP. This added function will improve the CPAP's effectiveness in alleviating the symptoms of sleep apnea.

Client Requirements

- Automatic
- Compatible with albuterol
- Adjustable amount of drug delivery
- User interface to adjust the start time and duration of administration of up to three doses of albuterol during the patient's sleep cycle

Design Requirements

Budget – Medical supplies are available through client as well as an unspecified amount of funding.

Cost of Prototype Construction – Should not exceed \$500 (with CPAP and Nebulizer supplied at no cost).

Drug Types – Albuterol, with the possibility of using other drugs in the future.

Drug Delivery – Appropriate dose of aerosolized drug should be deliverable either in intervals or continuously. Amount of drug used will have to be compensated for depending on how efficiently the aerosolized drug can make it from the nebulizer to the patient's lungs.

Durability – Modified component should, with proper maintenance, be usable for six months without need for replacement.

Ergonomics – Must be comfortable, quiet, and not interfere with the patient's sleep.

Performance Requirements – Must not compromise the normal function of the CPAP. Normal functioning of aerosolized drug should take place during use of CPAP. Nebulization should be timed to correspond with the patient's inhalation, so that minimal drug is wasted.

Safety - Risk of drug overdose should be considered.

Size/ Weight – Modification to CPAP device should not weigh more than 1 kg and should not protrude from original device more than 10 cm.

Targeted Users - Adults (18+) with sleep apnea

Usage Time/ Frequency – Device should be made to work for nightly 8 hour intervals.

Maintenance – A marketable design should require less than 10 minutes of maintenance by the patient on a daily basis. Maintenance by a specialist should be necessary no more than twice a month.

Usage Environment – Used by patient in patient's home or at a hospital.