



Application of Automated Intermittent Suction Technology to SSD: Development and Clinical Experience in Long-term Care in Germany

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We began our collaboration more than 7 years ago, combining knowledge from backgrounds in long-term nursing care, wound care and respiratory care. Our goal was to improve subglottic secretion drainage in patients intubated with tracheal or endotracheal tubes – tubes with an integrated suction lumen.

The Gesundheits Manager Institute for wound care, nursing care, hygiene management, and respiratory care, services the Intensive Care Clinic, IPK (intensive.pflege.klinik GmbH & Co. KG), an independent long-term care facility in Nuremberg, specializing in the care of traumatic brain injury patients, and other patients neurologically severely impaired. A staff of over 25 multi-disciplinary specialists cares for 60 patients at any given time in the IPK, 40 of whom on average are coma patients of two types.

Ninety percent of the patients are Awake Coma, patients who sleep at night and open their eyes in the morning. They cannot talk, but have day and night routines. The remaining patients are classified Coma, with eyes closed 24/7.

Our decision to explore and refine automated subglottic secretion drainage began as a logical response to dissatisfaction with traditional suction methods and the search for efficient alternative solutions. People produce 1-2 liters of saliva a day, equivalent to 333-666 mL every 8 hours. Those who are able to swallow, do so 1,000-3,000 times a day. For our impaired population, with severe dysphagia and even absent spontaneous swallow response, we were seeking a practical way to capture the saliva and other secretions above the ballooned cuff of the tracheal tube, to prevent VAP, skin problems around the stoma, and patient discomfort.

Over the past 5 years, at the IPK and in surrounding clinics in the Nuremberg area, we have treated 60 patients using automated intermittent aspiration of subglottic secretions by means of a new device, the SIMEX Subglottic Aspiration System (YOX SSD, KOIKE MEDICAL). There is SIMEX pump model, the cuff S. The cuff S is for stationary use, at the patient bedside and in surgical settings.

Beginning with our earliest experiences with the system, we focused primarily on three parameters: suction pressure, the duration of suction, and the interval between individual suction periods. Our goal was to tailor the suction pressure to the needs of the individual patient depending on the amount of secretions and the viscosity, while keeping overall suction to a minimum and within the AARC recommended pressure guidelines.

The SIMEX system (YOX SSD, KOIKE MEDICAL) allows for pressure settings ranging from -15 to -225 mmHg (-2kPa to -30kPa). Suction intervals can be set from 5-60 seconds “ON,” time and from 1-60 minutes “OFF” time. AARC recommends the use of -80 to -150mmHg. (-10.6kPa to -19kPa).

We were encouraged by the initial responses observed. Secretions were readily collected in the canisters. We observed immediately that the amounts of secretions being collected were much higher (several-fold), than with the use of syringes. Maceration around the stoma of patients was reduced, and later frequently prevented, as experience with the system was gained.

In contrast with the manual suctioning of patients using syringes, which frequently causes coughing, sometimes severe, and an increase in body tone, heart rate and respiration, the automated suctioning using the system was quiet and very well tolerated.

Vital signs remained constant.

5-Patient Study and Caregiver Survey Results

In another step to quantify treatment results with the system as well as to gather data on the use of resources, and feedback from caregivers, Fain led the development and conduct of a study within the facility that included a survey of caregivers. From March 13-24, 2014, 5 patients requiring SSD were selected from the population in the clinic. Patients were observed for a total of 10 days. Each patient received manual suctioning by syringe for the first 5 days, followed by use of the SIMEX cuff S in the final 5 days. The system settings were determined according to each patient's condition, and ranged from -75 to -150mmHg (9.9kPa to 19kPa). The “ON” time of aspiration was set at 10-15 seconds, and “OFF” time at 10-15 minutes. A total of 26 nurses took part in the survey. Results are shown in the table of next page.

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Results		
Based on mean average of 5 patients who were observed for total 10 days. Manual aspiration used during initial 5 days and automated aspiration used in final 5 days. The system parameters tailored to patient's Condition. Aspiration pressure ranging between -10kPa to -20kPa , Aspiration on time of 10-15sec, and OFF time of 10-15min.		
	Manual ballooned cuff aspiration a 20mL syringe	Automated Intermittent Subglottic Aspiration system -SIMEX cuff S (YOX SSD, KOIKE MEDICAL)
Tracheostomy tubes Portex, BouleLine, Suctionaid GR. 8 or 9		
Mean aspirate volume removed	approx. 33mL	approx. 400mL
Duration	5 days ⇒ 8 times daily during shift	5 days automatic intermittent aspiration
Materials Used	40 syringes (20cm), 40 pairs of gloves, 50 dressings	1cuf S aspirator, 1 aspirator collection container 1suction tube
Results	<ul style="list-style-type: none"> - aspiration only possible on an interval-type basis - increased risk of sputum to microaspirate into the lungs - time consuming - severe cough stimulus during aspiration - stoma remains macerated and extremely damp as a result of the enormous amounts of sputum that come out due to overflow - additional stoma care, need for dressings and change of clothing and bedding - erythematous skin around the risk - high frequency of endotracheal book 	<ul style="list-style-type: none"> - automated intermittent aspiration - 24/7 - minimized risk of any sputum to microaspirate into the lungs - unobtrusive sounds during aspiration - aspiration does not have a negative impact upon breathing, the cough stimulus or physical tone - stoma is dry and less irritated from the first day onwards - immediate positive feedback from nursing staff → see survey - reduction in the frequency of endotracheal bronchial aspiration



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ヨックスディスプレイとの組み合わせ例