

Case study two: Silhouette breathing system™

The Silhouette breathing system™ is a low profile, single use nasal mask and breathing circuit. With four size options, it allows for fit to a wide variety of nose sizes and shapes. Gas and vacuum tubing run over the ears and under the chin.

It uses a nasal hood with single use small diameter cannula style tubing. The reservoir bag is removed as it will not function with smaller diameter tubing. It is available in four sizes with reusable sizers to help staff select the right one beforehand.

Using the Silhouette™ enabled the team to reduce the flow rate of the mixed gas. They agreed a local protocol to start at lower flow rates than before (at an average of 2.5 LPM) and increase as needed for the individual patient. This local protocol, enabled by Silhouette™, reduced waste as less gas was used.

The team used the Silhouette™ with their existing manual flowmeter that was connected to medical gas pipeline systems for both oxygen and nitrous oxide.

However, this can be used with small, portable wall-mounted or trolley-secured cylinders too (this is model dependent).

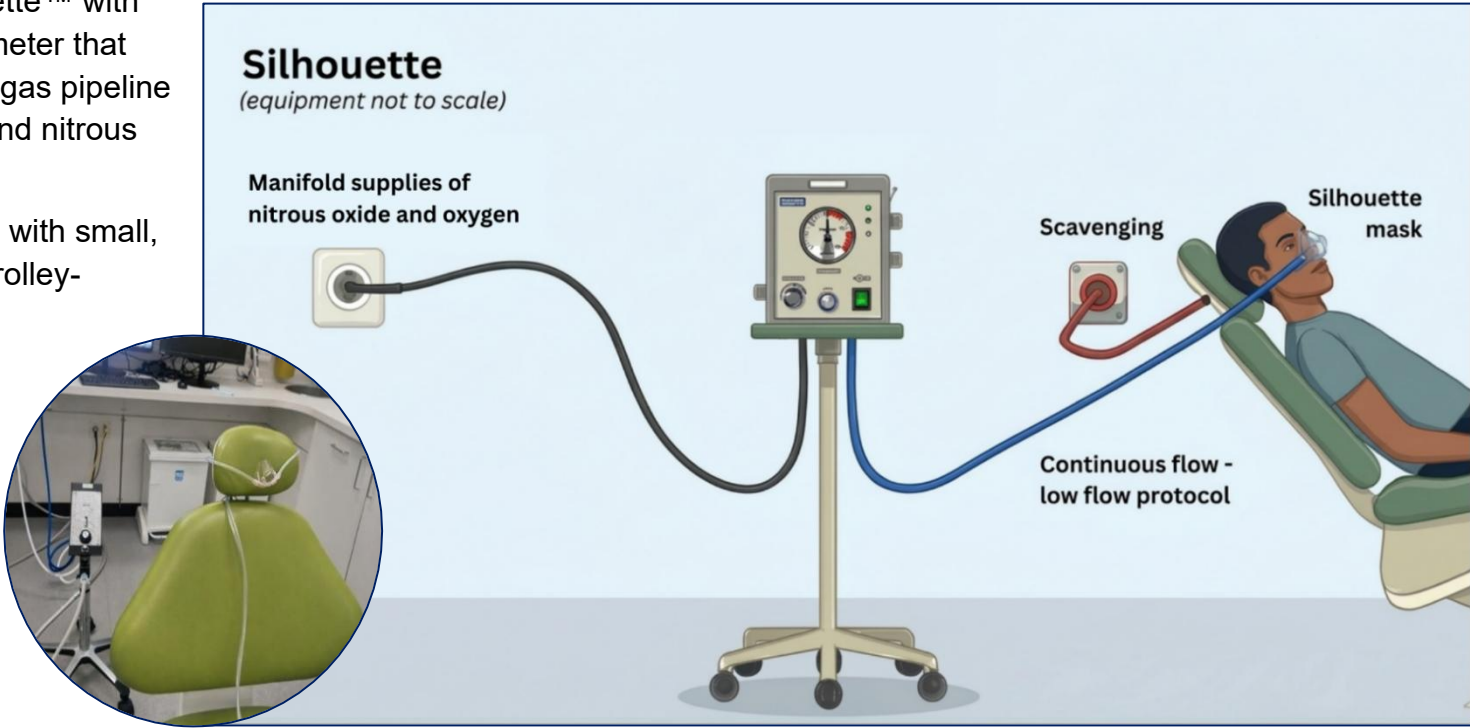


Figure one: an illustration to show the set-up of the Silhouette (coupled with a low flow protocol) at the Eastman Dental Hospital, accompanied by a photo of the set-up in the room

Results

Silhouette™ coupled with a low flow protocol achieved a **58% reduction** in nitrous oxide use per patient.

The table compares the volumes of gas and carbon footprint of current practice and Silhouette™ coupled with a low flow protocol:

	Current practice (n=34)	Silhouette™ coupled with a low flow protocol (n=30)
Volume of N ₂ O (L)	65.9 L	27.44 L
Carbon footprint from gas	35.58 kg CO ₂ e	14.81 kg CO ₂ e
Reduction compared to prior practice		58% ↓

Patient outcomes

The team monitored patient outcomes (defined as successful sedation) to ensure clinical standards were maintained. The Silhouette™ coupled with a low flow protocol had a success rate of 87%. This figure reflects UCLH's local definition of successful sedation: the planned dental procedure being completed using inhalation sedation. This could be an incidental finding rather than indicate replicable effectiveness elsewhere.

Patient feedback

Patient feedback questionnaires were completed for 28 of the 30 Silhouette™ cases. Of those, 26/28 patients found the nasal mask comfortable to wear, 28/28 reported that breathing the gas through their mask felt comfortable, and 26/28 patients said they would recommend this type of sedation to a friend.

In free-text responses, a small number of patients commented that the nasal cannula part was uncomfortable. These comments were limited in number and did not affect the overall success of sedation.

Staff

Staff feedback was collected after each patient case. Silhouette™ users highlighted improved access, for example, the smaller mask size and the ability for patients to move their head more freely. Some noted that the tubing could be bulky or obstructive.

Other considerations

Carbon costs

The Silhouette™ system coupled with a low flow protocol uses single-use nasal masks and tubing for each patient. While the carbon footprint of these materials and their disposal is low in absolute terms, for the Eastman, this introduced additional single-use plastic waste in the form of the mask (and some parts of the tubing). This does not outweigh the carbon savings from reduced nitrous oxide use, but it is a wider environmental consideration.

Financial costs

Silhouette™ coupled with a low flow protocol, has a lower initial set-up cost, as it adapts existing equipment, but introduces ongoing consumable costs for single-use masks and tubing at the Eastman. Financial implications and the considerations around introducing single-use equipment will differ depending on the equipment and processes a Trust or service already has in place.

Context and limitations

Given the small sample size, results should be treated as indicative rather than conclusive. Services considering this approach should review their own local context, clinical needs and existing equipment before deciding whether to adopt it.

It is recommended that services speak directly to the suppliers to understand costs for Silhouette™ in more detail. This can be done by contacting info@ramedical.com.

Please note, use of Silhouette was coupled with a low flow rate to achieve benefits. The average flow rate used was 2.5 LPM, lower than manufacturer recommendations. Adoption must be accompanied by use at lower flow rates if benefits are to be realised.