COMPARATIVE COST ANALYSIS OF PHILIPS NASAL ALAR SPO_2 SENSOR VERSUS DISPOSABLE ALTERNATIVES

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I. INTRODUCTION

Blood oxygen saturation levels require monitoring for health reasons in a wide range of circumstances. Low blood oxygen saturation, if identified to be hypoxemia, requires medical intervention and has been linked to an increased risk of death(Shi, Goodall et al. 2022). Oxygen saturation from pulse oximetry (SpO_2) is measured by analyzing the relative amount of red and infrared light absorbed as it fluctuates with the cardiac cycle(Chan, Chan et al. 2013).

Traditional disposable SpO_2 sensors, particularly finger sensors, come with high costs and generate significant medical waste(Palmer 2021). The objective of the study was to assess whether Philips Nasal Alar SpO_2 Sensor offers an innovative alternative that ensures accurate readings while reducing both costs and environmental impact.

II. METHODS

A 2005 review by Giuliano et al. found that studies conducted in both clinical and laboratory settings did not offer strong evidence that any single new-generation device outperformed others (Giuliano and Higgins 2005).

For years, U.S. hospitals have faced mounting financial pressure due to persistent workforce shortages, disruptions in the supply chain for drugs and supplies, and high inflation. These challenges have driven up costs, while reimbursement increases from government payers have been inadequate, and administrative burdens from commercial health insurers have grown (AHA 2024). Taken together, these issues have created an environment of financial uncertainty where many hospitals and health systems are operating with little to no margin (AHA 2024).

In light of these challenges, an economic cost model was developed to compare the costs of the Philips Nasal Alar SpO_2 Sensor with traditional disposable sensors in a mid-sized US hospital. This model evaluated the overall costs, average daily consumable costs, operational workflow efficiency, and the impact on medical waste reduction.

Clinical input parameters used in the model are reported in Table 1.

Parameter	Value	Reference
Number of SpO_2 monitored beds	130	(DefinitiveHC 2023)
Average length of stay (days)	4.5	(DefinitiveHC 2023)
Daily SpO_2 monitored census (patients)	130	Assuming all patients get checked
Number of difficult-to-measure patients (per day)	43	Assuming 1/3 of all patients are difficult to measure
Number of standard perfusion patients (per day)	87	Calculation (All patients – difficult-to-measure patients)
Sensor cleaning time in minutes	15	Assumption
Wipes	8g	Self-measured data*
Adapter cables	130g	Self-measured data*
Disposable sensor	36g	Self-measured data*
Specialty sensor	25g	Self-measured data*
Alar sensor	43g	Self-measured data*

Table 1. Clinical input parameters

* Self-measured data: weights were measured using a calibrated scale to ensure accuracy.

Economic input parameters used in the model are reported in Table 2.

Parameter	Value	Reference
Average cost of Alar*	31.98 $	(Tri-Anim 2024)
Average cost of adapter cables*	80.67 $	(Tri-Anim 2024)
Average cost of disposable finger sensors*	22.67 $	(Tri-Anim 2024)
Registered nurse rate per hour	41.38 $	(USBLS 2023)
Cost of waste in $/kilograms	3.12 $	(Vaccari, Tudor et al. 2018) inflated to 2024 values
Number of disposable finger sensors used per month	5,250	Calculation
Number of finger sensors used for difficult-to-measure patients per patient per day	2	Assumption
Number of finger sensors used for standard perfusion patients per patient per day	1	Assumption

Table 2. Economic input parameters

* Average costs of Alar/ adapter cables or disposable finger sensors provided are intended for modeling purposes only. The final actual price may be higher or lower depending on various factors, including the number of patients served or volumes committed, and state/hospital-specific conditions and regulations. These variables can impact the overall price of sensors and cables.

III. RESULTS

The economic analysis demonstrated that implementing the Philips Nasal Alar SpO_2 Sensor in a mid-sized hospital can lead to substantial cost savings in SpO_2 monitoring, reducing overall expenses by approximately 76% or $1.1 million annually (Figure 1). Current sensor costs total $1,434,208 annually, while Philips Nasal Alar SpO_2 Sensor alone costs $340,522 and $834,465 when used for low perfusion cases (Figure 1). These savings are notable whether the Philips Nasal Alar SpO_2 Sensor is used as the sole solution or for low perfusion, mainly due to its reusability and longer lifespan, making it a more cost-effective long-term option.

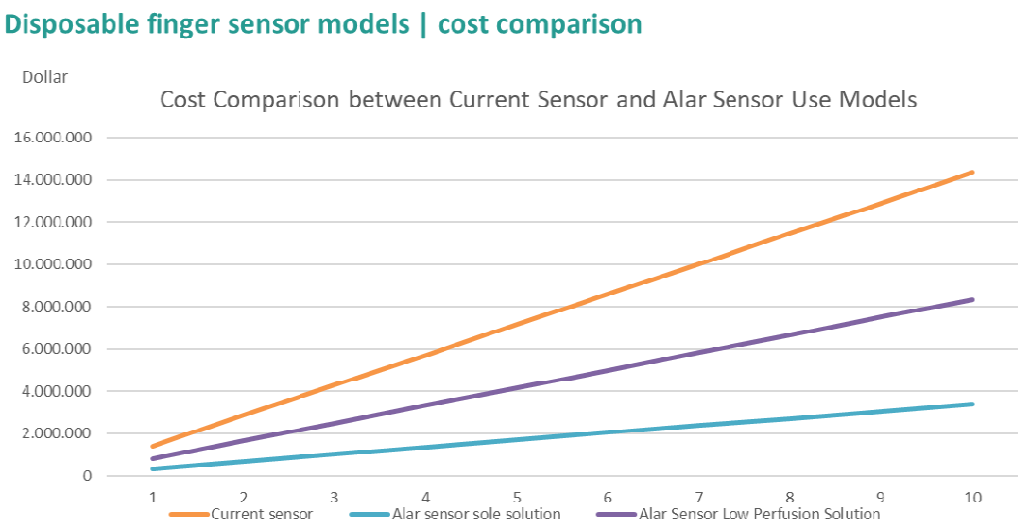

Figure 1. Disposable finger sensor - cost comparison

The average cost of SpO_2 consumables using Philips sensors is consistently kept below $7.2 per patient per day. This is considerably more economical than using other disposable sensor options, which average $30.2 per patient per day. If a mid-sized hospital with 130 beds were to switch all patients to the Alar sensor, it would result in substantial monthly savings of $91,140 (Table 3).

	Current Spend	Spend with Alar replacing all disposables	Difference (Current – Alar)
Finger sensors per month	$119,226	$0	$119,226
Cost of Adapter cables per month	$291	$291	$0
Alar Sensors per month	$0	$28,086	-$28,086
Monthly $Sp0_2$ spend	$119,517	$28,377	$91,140
Daily $Sp0_2$ spend per patient	$30.24	$7.18	$23.06

Table 3. Monthly and daily SpO_2 costs

Using Philips disposable SpO_2 finger sensors significantly reduce medical waste compared to solely using other disposable sensors in a mid-sized US hospital, with an annual waste reduction from 2,279 kg to 459 kg (Figure 2). The lightweight design of the nasal alar sensor produces less material waste per use, promoting environmentally conscious healthcare practices.This reduction in waste not only contributes to cost savings, but also aligns with the growing importance of environmentally conscious healthcare practices, helping to lessen the environmental impact of medical procedures.

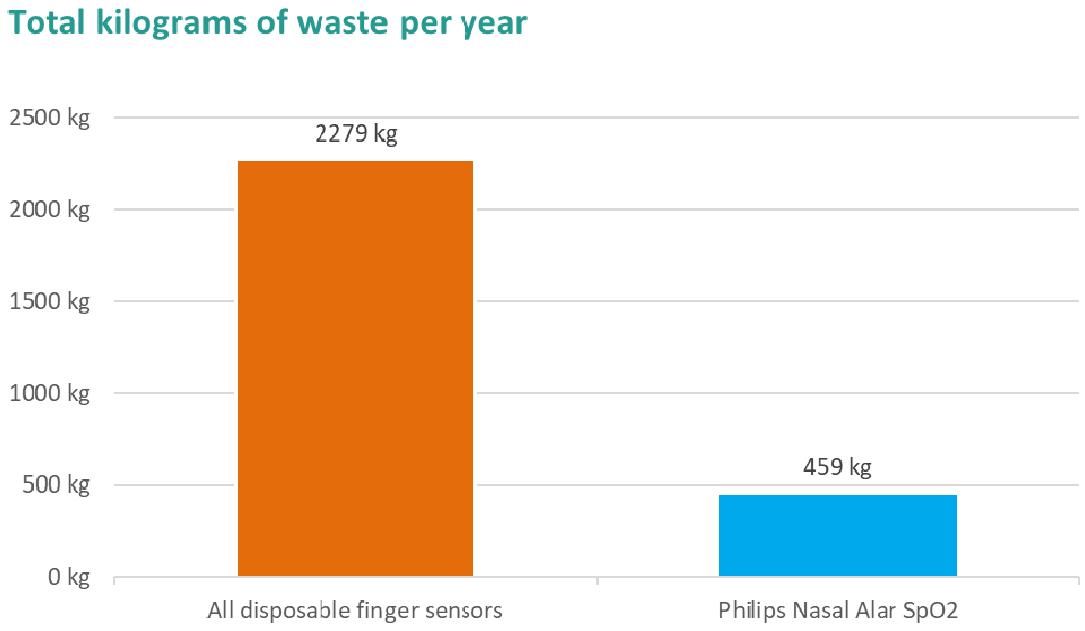

Figure 2. Total kilograms of waste per year

The Philips Nasal Alar SpO_2 Sensor enhances workflow efficiency in clinical settings. Its user-friendly design and reliable performance reduce the time and effort required for sensor replacement, allowing healthcare providers to focus more on patient care. This improvement streamlines hospital operations and optimizes overall healthcare facility functionality.

IV. CONCLUSIONS

The Philips Nasal Alar SpO_2 Sensor offers a holistic solution to the financial, operational, and environmental challenges associated with SpO_2 monitoring. By reducing costs by up to 76%, translating to annual savings of approximately 1.1 million US$, Philips Nasal Alar SpO_2 sensor demonstrates clear economic benefits. Beyond cost savings, its operational efficiency streamlines clinical workflows, making SpO_2 monitoring more effective and user-friendly for healthcare professionals. Additionally, the sensor's lightweight and thoughtful design promotes environmentally conscious healthcare practices, aligning with the growing emphasis on sustainability in the healthcare sector. These combined benefits make the Philips Nasal Alar SpO_2 Sensor a valuable asset in modern medical settings, supporting both financial and ecological goals while enhancing patient care.

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