

Comparison of **Disposable vs. Reusable** Robotic Bronchoscopes

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Reusable bronchoscopes have been a staple of first-generation robotic bronchoscopy systems

Both the Monarch™ platform, launched in 2018, as well as the Ion™ endoluminal platform, launched in 2019, offer reusable bronchoscopes, while the second-generation platform from Noah Medical – the Galaxy System™ – offers a disposable bronchoscope.¹

While the Ion system uses fiberoptic bend sensors to maintain orientation in space, the Monarch’s and Galaxy System’s scopes use electro-magnetic navigation (EMN) to maintain spatial orientation. The Galaxy System also includes integrated digital tomosynthesis capability.¹

Key attributes of the three different bronchoscopes¹

	Monarch Robotic Bronchoscopy System	Ion Endoluminal System	The Galaxy System
Navigation technology	EMN	Shape sensing	EMN with digital tomosynthesis (TiLT+ Technology™)
Outer diameter	Outer sheath: 6mm Inner scope: 4.2mm	3.5mm	4mm
Working channel diameter	2.1mm	2mm	2.1mm
Vision during Bx	Yes	No	Yes
Scope reprocessing	Yes	Yes	Not needed (disposable)

It is important to note that, unlike the Monarch and Galaxy System scopes, which have integrated vision capability, the Ion scope doesn’t. Instead, vision is achieved through using a vision probe inserted through the scope, which must be removed at the time of biopsy. The vision probe would incur an additional cost.



Galaxy System single-use bronchoscopes have integrated vision capability

Several organizations (such as AORN, SGNA, ANSI/AAMI, etc.)
provide reprocessing standards and guidelines.
Depending on the organization, the number of steps
involved in reprocessing could vary

up to **34 steps**.²



Single-use disposable bronchoscopes offer several advantages over reusable bronchoscopes

1) Hidden costs of reprocessing re-usable bronchoscopes

- Reprocessing one flexible endoscope requires approximately **76 minutes of hands-on staff time**.²
- The cost of reprocessing one endoscope ranges from **\$114.07 to \$280.71**.²

Disposable bronchoscopes have a straightforward purchasing cost and **require no reprocessing**, thus improving efficiency.

Reusable bronchoscope reprocessing requires
~76 minutes
of hands-on time²

Disposable bronchoscopes
require no reprocessing

Average cost of treating an acute respiratory infection in North America is

~\$29,000⁵

Disposable scopes are sterile, reducing the risk of cross-contamination

2) Cross-contamination risk and associated treatment costs

- Reusable bronchoscopes have a reported incidence of **cross-contamination or infection of 2.8%**.³
- **Microbial growth and residual contamination** was seen in **58% and 100%** of inspected scopes respectively, after manual cleaning.⁴
- Average cost of treating an **acute respiratory infection** in North America is **~\$29,000**⁵
- **Pathogen transmission** can occur even when bronchoscope cleaning and disinfection practices align with current guidelines.⁴

Disposable scopes are provided sterile and require no sterilization or disinfection before use, thus **mitigating nosocomial cross-contamination risks**.

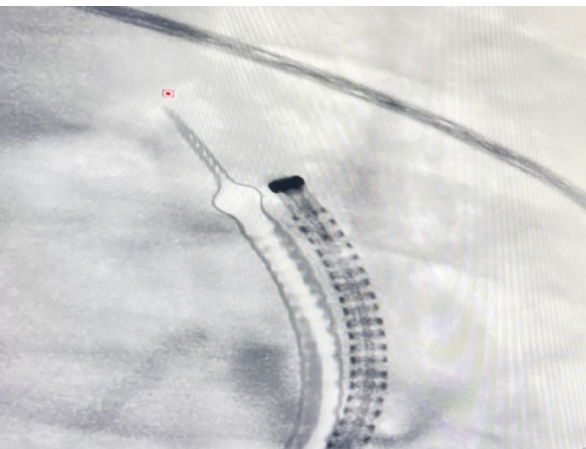
3) Highly negative environmental impact

A comparison of the production and disposal of single-use bronchoscopes with the reprocessing of reusable bronchoscopes (each time) shows the following results:

- **Reusable bronchoscopes** have about **80% higher CO²-equivalent emissions** than single-use bronchoscopes.⁶
- Energy requirement for reusable bronchoscopes is **90% higher** than for single-use bronchoscopes.⁶

It is important to note that the exclusion of manufacturing and disposal of reusable bronchoscopes suggests that the assessment of this option is fairly conservative.

Reusable bronchoscopes energy requirements are
90% higher
than for single-use bronchoscopes⁶



4) Impact on scope performance

Flexible endoscopes are particularly difficult to disinfect and easy to damage because of their intricate design and delicate materials.⁷

- **Reusable bronchoscopes** were seen to have **visible defects after manual cleaning in 100% of inspected scopes.**⁴
- **Scope drift** – a situation, as shown in the image to the left, where the stability and targeting of the scope is compromised, when a tool is inserted – may occur due to scope fatigue from frequent reprocessing.



5) Other advantages of single-use bronchoscopes

- Single-use bronchoscopes are associated with **less staff handling** of bronchoscopes before bronchoscopy, which should **reduce the risk of contamination.**⁸
- In situations where there is a shortage of PPE (required for reprocessing), single-use bronchoscopes can offer an advantageous alternative.⁸
- In situations where there is no staff available to clean bronchoscopes, such as “out-of-hours” bronchoscopy and bronchoscopy outside of the endoscopy or bronchoscopy suite, single-use bronchoscopes can be used.⁸

Summary

When assessing the cost of using either single-use scopes or reusable scopes, it is important to factor in the various hidden costs, higher risk of cross-contamination, and the higher negative environmental impact associated with reusable scopes.

A disposable scope improves efficiency, reduces the burden of hospital staff, and helps to de-risk the procedure from cross-contamination, infection, and product damage caused by reprocessing.

The FDA also recommends that disposable bronchoscopes should be used where there is increased risk of spreading infection or when there is no support for immediate reprocessing of the bronchoscope.⁹

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