Driving innovation in endoscopy

Michael Unger discusses some of the key healthcare challenges driving innovation in the design of endoscopy hygiene solutions and offers an insight into the ways in which industry is striving to help improve sustainability.

The ability to treat each patient in the best way possible, whether for a routine or emergency procedure, is fundamental. Clinicians should be empowered with a range of options to ensure high quality care for all clinical needs. Providing comprehensive hygiene solutions that offer the power of choice to clinicians ensures they can optimally treat each patient, based on their specific condition. Increasingly, healthcare providers and patients are recognising that human health and the planet's health are directly related. The healthcare industry is a major emitter of greenhouse gases emissions, demonstrating the urgency to offer treatment that best protects patients and the planet.

In endoscopy, reusable and semi-disposable endoscopes are often used in standard procedures. In the most urgent and critical situations, clinicians are increasingly considering single-use solutions. So, how can manufacturers best support clinicians to address each patient's unique needs?

By listening to what physicians, nurses, and reprocessing staff are experiencing, manufacturers can better support healthcare providers with a diverse range of innovative and environment endoscopic solutions. For this reason, Pentax Medical is expanding its product offering to do just this – to offer physicians in endoscopy the power of choice.

Enhanced drying and storage for reusable scopes

As reusable and semi-disposable endoscopes are often used in standard procedures, safe and effective reprocessing of endoscopes is crucial. Research shows that to create and maintain an endoscopes' disinfected status, complete drying is an absolute necessity. Dr. Kovaleva, a clinical microbiologist and clinical pathologist, with the department of laboratory medicine, at AZ Rivierenland, Belgium, explains: "During an endoscopy, the environment provides optimal conditions for contamination and subsequent growth of biofilms. Biofilms are communities of microorganisms within extracellular polymeric material attached to different surfaces, including human tissues, medical devices, water supply systems, or endoscope channels."

Dr. Kovaleva adds that it is crucial to remember that drying and storage, in endoscopy reprocessing, are just as important for preventing against infection as cleaning and high-level disinfection. Accurate drying greatly reduces bacterial contamination of stored endoscopes.

The Pentax Medical PlasmaTYPHOON and PlasmaBAG system provide fast drying and active storage of endoscopes – substantially reducing drying times from hours to just minutes, while maintaining the disinfected state of endoscopes for up to 31 days.[1] The PlasmaTYPHOON+, the newest generation of the technology, dries even faster – in just 1- 3 minutes; as well as providing full traceability (both printed and digital) with audit-ready data-records.

Endoscopy units can therefore reduce waiting times between procedures due to the improved turnaround times, and reprocessing units can experience more efficient workflows. The storage solution provided with the PlasmaTYPHOON+ and PlasmaBAG system makes reusable scopes available whenever and wherever needed, while offering a sustainable alternative to single-use endoscopes.

Working towards greater safety and hygiene for patients should not come at the cost of the planet's health, according to Rainer Burkard, president of Pentax Medical EMEA. "It has always been our mission to help improve people's lives through intelligent solutions. In this way, we aim to contribute to a brighter future for coming generations, by improving health and minimising the impact on our planet," he comments.

The 2030 Agenda for Sustainable ▶

Development, adopted by all UN Member States in 2015, recognises this balancing act – ending worldwide inequalities and improving people's health and education should be done simultaneously with fighting climate change. This agenda provides different road maps, through 17 different Sustainable Development goals, to improve peace and prosperity while protecting and cleaning up our planet. Adhering to these global goals helps change the norm for all industries, incentivising them to build a sustainable future by finding environmentally-friendly solutions for related thematic issues, including – but not only – energy, climate, science and technology.[2]

Acting as a blueprint, it enables all businesses and organisations worldwide to help each other to achieve these goals. 'Circular innovation' and technological progress, such as increased resource and energy-efficiency, are key to finding lasting solutions to these challenges. The aim is to reduce waste and consumption of resources by forming 'closed-loop cycles' focused on recycling and reusing resources. The resulting minimisation of waste flows and greenhouse gas emissions ultimately lessen the strain of the environment.[3]

As greater transparency surrounding the environmental footprint of hospitals is increasingly becoming more of a driving factor for hospital management, it is important for medical device manufacturers to recognise the need for action to tackle global challenges, such as climate change. Medical device manufacturers should take responsibility and aim for a balance between patient safety and the inevitable impact on the environment and climate.

Prof. Sebastian, a consultant gastroenterologist and lead clinician at the IBD unit in Hull University teaching Hospitals, UK, recently discussed sustainability in endoscopy during Pentax Medical's Digital Hygiene Event.[4]: "The endoscopy community as a whole must act now to develop devices, processes and systems to adopt green endoscopy principles. Our "Green Endoscopy" (@GreenEndoscopy) movement aims to acknowledge, advocate, educate and promote research to make endoscopic practice to align with core principles of environmentally sustainable healthcare," he explained.

Real change, both economic and environmental, comes from understanding the healthcare landscape – and reshaping it. With this in mind, Pentax Medical is striving to limit the use of raw natural resources, maximise product lifetime and reusability, and repurpose waste as resources, all while improving and innovating for greater hygiene and safety in endoscopy.

The healthcare industry accounts for 4% of global greenhouse gas emissions[5] and endoscopy, in particular, is one of the main contributors of healthcare's environmental footprint.[6] To ensure patient safety, the production of medical products is regulated by stringent quality assurance processes and safety regulations. Carbon emissions cannot always be completely avoided, therefore. To compensate for this, it is important for manufacturers to seek ways to neutralise carbon emissions. They need to build a resilient infrastructure, promoting inclusive and sustainable industrialisation and fostering innovation.[7] With this in mind, the PlasmaBAG[8] is now available as 'carbon neutral'.[9] The PlasmaTYPHOON+ and PlasmaBAG system reduces the risk of infection, while also offsetting all carbon emission emitted during the production process.

Saving natural resources

The proliferation of waste, but especially the lack of disposal responsibility, poses a great threat to natural resources. The healthcare industry alone produces around two million tons of waste every year – from which the majority is of low risk and could easily be recycled.[10] Pentax Medical is striving to ensure sustainable consumption, production pattern, packaging and logistics.[11] To change the norm, they plan on reducing plastic use, refurbishing used parts and using recycled material to help save natural resources and reduce waste.

The medical device manufacturer has always offered repair services to extend product life cycles but to make these repair processes more sustainable and focusing on 'reduce and reuse', they also refurbish parts from discarded endoscopes and processors and use these for repairs. Moreover, the introduction of a new PlasmaBAG endoscope storage bag made with 80% recycled polyethylene, starting in 2022, demonstrates how developing sustainable solutions that require less resources but yield greater results is a top priority.

Improving energy efficiency

Drying and storing reprocessed endoscopes can be a time consuming and energy-intensive procedure due to their complex design. Regular solutions require long drying cycles and continuous medical air and heat supply for storage, which involves non-stop electricity consumption. With the latest drying and storage system, the PlasmaTYPHOON+, Pentax Medical managed to significantly reduce energy and overall electricity consumption while improving efficiency, yielding a small footprint for endoscope drying and storage. This is in addition to offering a more intuitive user experience – making processes safer and easier for reprocessing staff, helping them to prepare scopes in advance, store them in a protected environment, and transport them safely across the hospital.

Prioritising patient's needs ensures healthy lives and promotes well-being at all ages – which is essential to sustainable development.[12] Prof. Herth, medical director and chief physician of the department for internal medicine – pneumology, of the Thoraxklinik, Heidelberg, Germany, recently explained in a Patient Safety in Endoscopy podcast:[13] "The ecological debate should always be taken into account when considering the varying choice of endoscopes and bronchoscopes, along with cost-effectiveness – but, ultimately, decisions should always be based on the patients' needs," Prof. Herth commented.

High quality care without compromise

For some patients, reusable endoscopes are not an option. In critical situations, single-use endoscopes may be most suitable for the individual's needs. A semi-disposable endoscope solution provides all the benefits

of reusable endoscopes in combination with single-use hygiene consumables to further enhance infection prevention. Single-use consumables can address the three main areas of concern for potential infection risk: the distal tip or elevator, the valves, and the channels.

Through evaluating unmet clinical needs and recognising the necessity for a duodenoscope that serves paediatric patients and adults with narrow anatomies, the Slim DEC Duodenoscope (ED32-i10; OE-A65) was just launched. It provides consistent therapeutic performance, outstanding visualisation, and reduces the risk of cross-contamination.

Bronchoscopy is also a clinical area which holds a high risk of infection, making the need of clean instruments increasingly pressing. Single-use scopes are ready-to-use, and potential vulnerabilities in the reprocessing of reusable scopes are therefore avoided. Moreover, for bronchoscopy procedures in intensive care units and emergency rooms, a constant supply of readily available sterile scopes is essential.

Pulmonologists can add single-use bronchoscopes to the existing solutions in their endoscopy suite procedure to simplify the workflow and best meet each patient's needs. In this light, and to further support physicians in providing the highest quality care even in the most urgent situations, the ONE Pulmo was introduced in Europe; a single-use bronchoscope with superior suction power and HD image quality.

Infection prevention is a crucial topic in endoscopy. It is said that single-use endoscopes represent a possible solution to transmission of infection during endoscopic retrograde cholangiopancreatography (ERCP). Yet, more data is needed on their functionality, financial implications and environmental impact or sustainability, before their wider adoption into clinical practice.[14] At the same time, the ability to treat each patient in the best way possible, whether for a routine or emergency procedure, is fundamental. Clinicians should be empowered with a range of solutions to ensure the highest quality care for all clinical needs.

In conclusion, patients' needs and that of our environment should remain a driving force for manufacturers innovating in endoscopy. It is important to find the balance between patient safety and environmental responsibility. Medical device manufacturers must aim to innovate solutions that address sustainability concerns, while also achieving their primary goal: to maximise patient treatment, physicians' comfort, maximise workflow and minimise the risk of infection. CSJ

References

1 Validated for up to 744 storage hours (31 days) according to NF EN 16442 norm. The maximum storage time may be subject to local regulations on endoscope storage.

2 United Nations. (n.d.-d). THE 17 GOALS | Sustainable Development. Sdgs.Un.Org. Retrieved February 9, 2022, from https://sdgs.un.org/goals

3 Nautiyal, H., & Goel, V. (2021). Sustainability assessment: Metrics and methods. Methods in Sustainability Science, 27–46. https://doi.org/10.1016/b978-0-12-823987-2.00017-9

4 PENTAX Medical digital Hygiene Event "Patient Safety, Hygiene and Sustainability: Discussing solutions for today's challenges in endoscopy" was held on March 1st, 2022.

5 Tennison, I., Roschnik, S., Ashby, B., Boyd, R., Hamilton, I., Oreszczyn, T., Owen, A., Romanello, M., Ruyssevelt, P., Sherman, J. D., Smith, A. Z. P., Steele, K., Watts, N., & Eckelman, M. J. (2021). Health care's response to climate change: a carbon footprint assessment of the NHS in England. *The Lancet Planetary Health*, 5(2), e84–e92. https://doi.org/10.1016/s2542-5196(20)30271-0

6 Maurice, J. B., Siau, K., Sebastian, S., Ahuja, N., Wesley, E., Stableforth, W., & Hayee, B. (2020). Green endoscopy: a call for sustainability in the midst of COVID-19. *The Lancet Gastroenterology & Hepatology*, 5(7), 636–638. https://doi.org/10.1016/s2468-1253(20)30157-6

7 United Nations. (n.d.-b). Goal 9 .:. Sustainable Development Knowledge Platform. Sdgs.Un.Org. Retrieved February 9, 2022, from https://sustainabledevelopment.un.org/SDG9

8 PlasmaBAG is part of PENTAX Medical PlasmaTYPHOON™ and PlasmaBAG™ endoscope drying and storage system.

9 PENTAX Medical supports the Togo reforestation project to compensate for the carbon emissions in the production of our PlasmaBAG™ endoscope storage bags. As a result, all PlasmaBAG endoscope storage bags are carbon neutral. Until 2021, Project Togo has planted more than 1,500,000 new trees in total, binding approx. 400,000 tons of atmospheric carbon annually. www.natureoffice.com/en/carbon-offset-projects/project-togo.

10 Singh, N., Ogunseitan, O. A., & Tang, Y. (2021). Medical waste: Current challenges and future opportunities for sustainable management. *Critical Reviews in Environmental Science and Technology,* 1–23. https://doi.org/10.1080/10643389.2021.1885325

11 United Nations. (n.d.-b). Goal 12 | Department of Economic and Social Affairs. Sdgs.Un.Org. Retrieved February 9, 2022, from https://sdgs.un.org/goals/goal12

12 United Nations. (n.d.-a). Goal 3 | Department of Economic and Social Affairs. Sdgs.Un.Org. Retrieved February 9, 2022, from https://sdgs.un.org/goals/goal3 Listen here: https://open.spotify.com/

13 Listen here: https://open.spotify.com/episode/1AZXDDL1djqyaLIphHA15x?si=gkYpA03CTry3YoaSclHo3w

14 Bang, J. Y., Sutton, B., Hawes, R., & Varadarajulu, S. (2019). Concept of disposable duodenoscope: at what cost? *Gut*, 68(11), 1915–1917. https://doi.org/10.1136/gutjnl-2019-318227episode/1AZXDDL1djqyaLIphHA15x?si=gkYpA03CTry3YoaSclHo3w

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