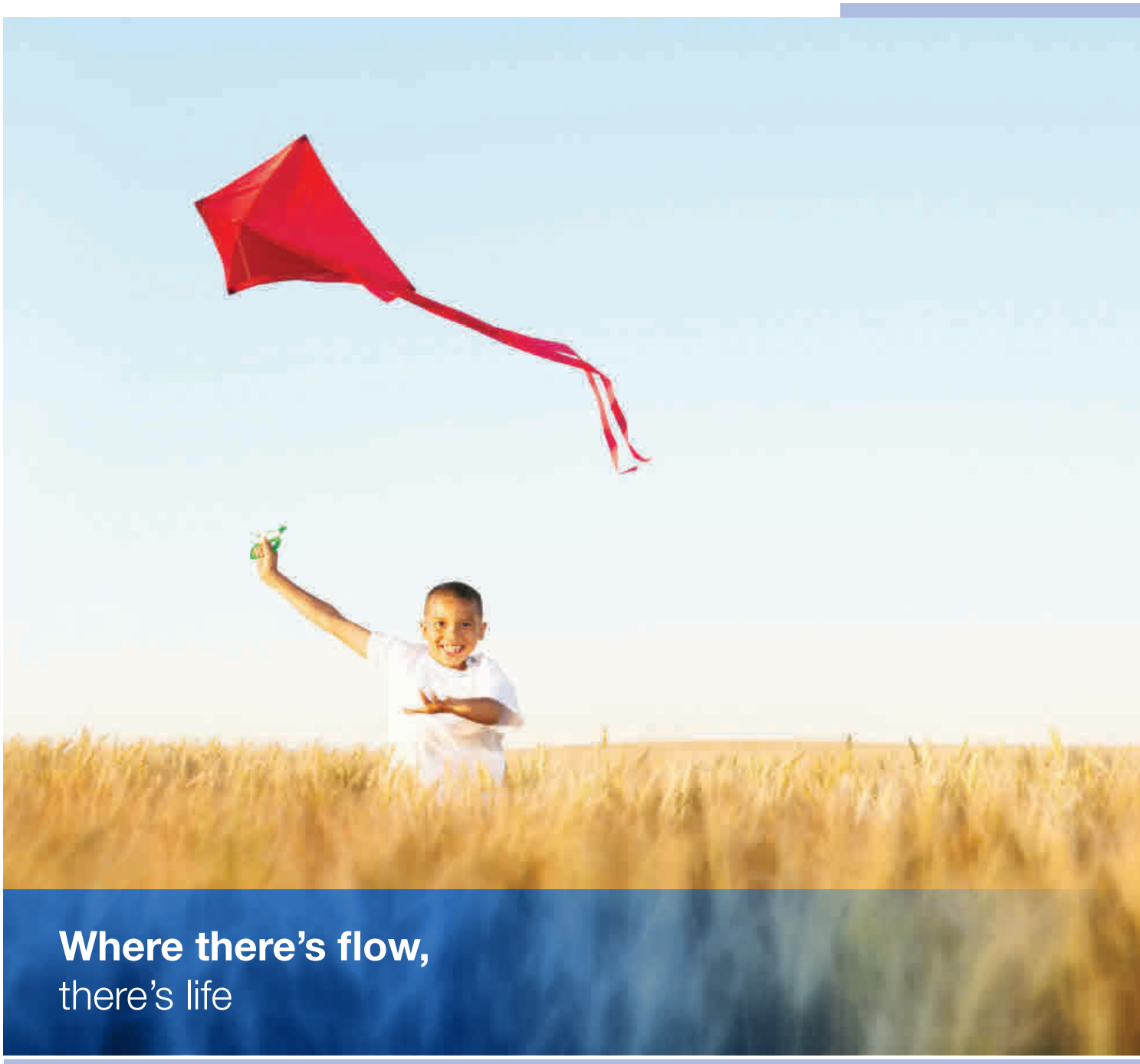
Deltex
medical



Where there's flow,
there's life

ODM

When fluid management really matters,

Not all cardiac output devices are the same

Widely proven and suitable for use across the surgical population, oesophageal Doppler monitoring (ODM) using the CardioQ-ODM, is the only minimally invasive therapy to measure blood flow directly in the central circulation.

The clinical benefits of the CardioQ-ODM stem directly from the use of a low-frequency ultrasound signal to measure blood flow directly in the central circulation.

Only Doppler works

Only the CardioQ-ODM has the precision necessary to guide successfully a 10% Stroke Volume Optimisation (SVO) protocol. Its considerable evidence base is testimony to the unique ability of the CardioQ-ODM to recognise and monitor 10% changes in Stroke Volume.

Other cardiac output devices do not have the required precision. Technologies using pressure as a surrogate for flow are confounded by changes in arterial compliance or impedance, regularly reporting changes in the wrong direction. As such, they are not appropriate to guide Stroke Volume Optimisation (SVO) without frequent, expensive, and time consuming recalibration by a more precise technology.

Flow versus Pressure

- During surgery, haemodynamics change frequently.
- Only direct flow measurement can detect such change precisely; surrogates cannot.
- Pulse Pressure Wave Analysis (PPWA) devices measure pressure not flow and are confounded by changes in resistance.

> The **Enhanced Recovery Partnership** fully supports the use of intraoperative fluid management technology to deliver individualised goal-directed fluid therapy. This is recommended in the 2012-13 NHS Operating Framework, in the Innovation, Health and Wealth Review, and in NICE Guideline MTG3.

(**Fulfilling the Potential:** A Better Journey for Patients and a Better Deal for the NHS (2012), NHS Enhanced Recovery Partnership)

The CardioQ-ODM waveform

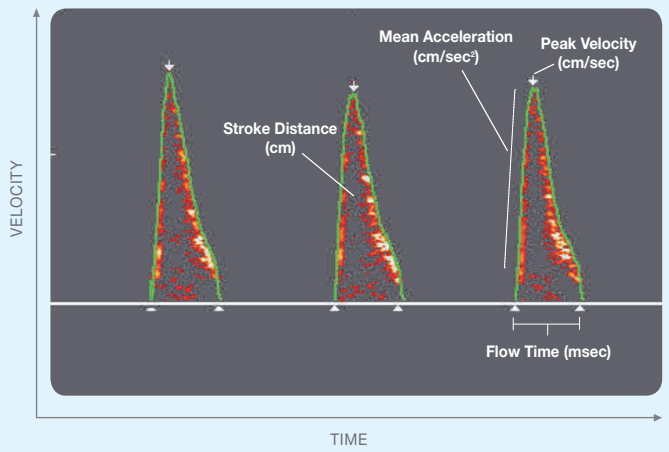


FIGURE 1

The green line indicates the velocity/time envelope that the monitor uses to make calculations. The white arrows indicate time and velocity values used for CardioQ-ODM calculations.

The Stroke Distance (SD) is the area under the waveform and is the basic measured parameter upon which calculations of Stroke Volume (SV) and all other Cardiac Output (CO) and indexed measurements are made.

Stroke Volume is the parameter of choice for fluid management protocols, however changes in Stroke Distance (SD) or Stroke Volume Index (SVI) can also be utilised.

think Doppler.

Only Doppler is recommended

The evidence in support of individually guided fluid management during surgery is centred on the implementation of oesophageal Doppler monitoring (ODM), using the CardioQ-ODM. The device has established an incomparable evidence base that is today acknowledged and endorsed by the **National Institute for Health and Clinical Excellence (NICE)**. The NHS has therefore decided to adopt ODM at pace and scale.

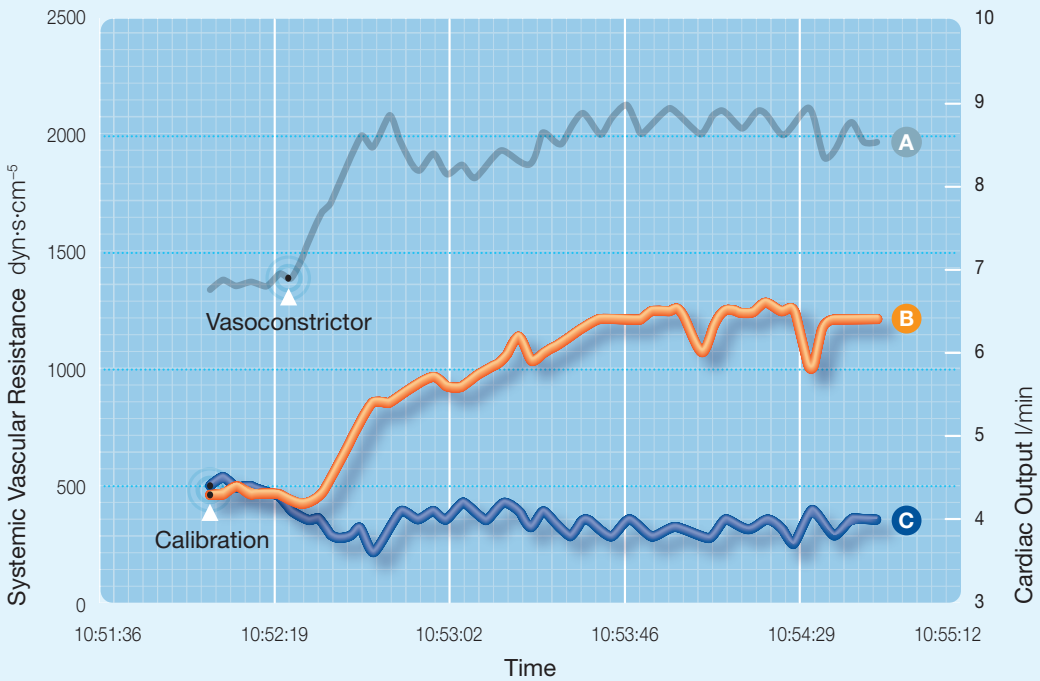
In its 2011 medical technology guidance on the CardioQ-ODM (MTG3), NICE asserts that the technology should be considered for use in patients undergoing major or high-risk surgery or other surgical patients in whom a clinician would consider using invasive cardiovascular monitoring.

Randomised, controlled trials using the CardioQ-ODM have demonstrated that early fluid management intervention will reduce post-operative complications, reduce intensive care admissions, and reduce the length of hospital stay.

To date, more than 500,000 patients have benefited from the use of the CardioQ-ODM, and the **NHS National Technology Adoption Centre (NTAC)** audit of over 1300 patients reported the benefits of ODM implementation in three hospitals:

- The post-operative **stay was reduced by 3½ days** and **CVC use** was **reduced by 23%.**
- The results also indicate a trend towards a **reduction in readmission rates, re-operations and mortality.**
- These real-world results replicate those from randomised controlled trials and as such, the technology constitutes a cornerstone of **Enhanced Recovery.**

Effect of a vasoconstrictor on flow-based and pressure-based cardiac output monitors



Unique insight

The graph to the left (FIGURE 2) illustrates the effect of a vaso-active drug on Systemic Vascular Resistance (SVR).
It demonstrates dramatically **the difference between a flow-based technology (CardioQ-ODM) and a pressure- based (PPWA) approach.**

FIGURE 2

This is a real patient event in which a vaso-active drug was administered. Almost immediately after the drug is administered, the pressure-based system **(B)** records the increased SVR **(A)** as an increase in flow. However, the unique and direct flow measurement of the CardioQ-ODM **(C)** shows the true - and opposite – result. The increased SVR causes a small fall in flow as the heart pumps against the increased vascular resistance.

PPWA devices using pressure as a surrogate for flow measurement lack the precision necessary to guide the SVO protocol and often indicate that flow has increased when in fact, the opposite has occurred. The unreliability of the PPWA approach is due to the frequent changes in arterial compliance during the operative period.

- A Systemic Vascular Resistance (SVR)
- B Pressure-based cardiac output monitor
- C CardioQ-ODM (Flow-based cardiac output monitor)

Direct flow measurement

Placing a single-use probe in the oesophagus, the CardioQ-ODM monitor uses **Doppler ultrasound technology** to determine directly a patient's central vascular blood flow and fluid status during the intraoperative period.

Easy to use and **quick to focus,** the device generates a low-frequency ultrasound signal, which is highly sensitive to changes in flow and measures them immediately.

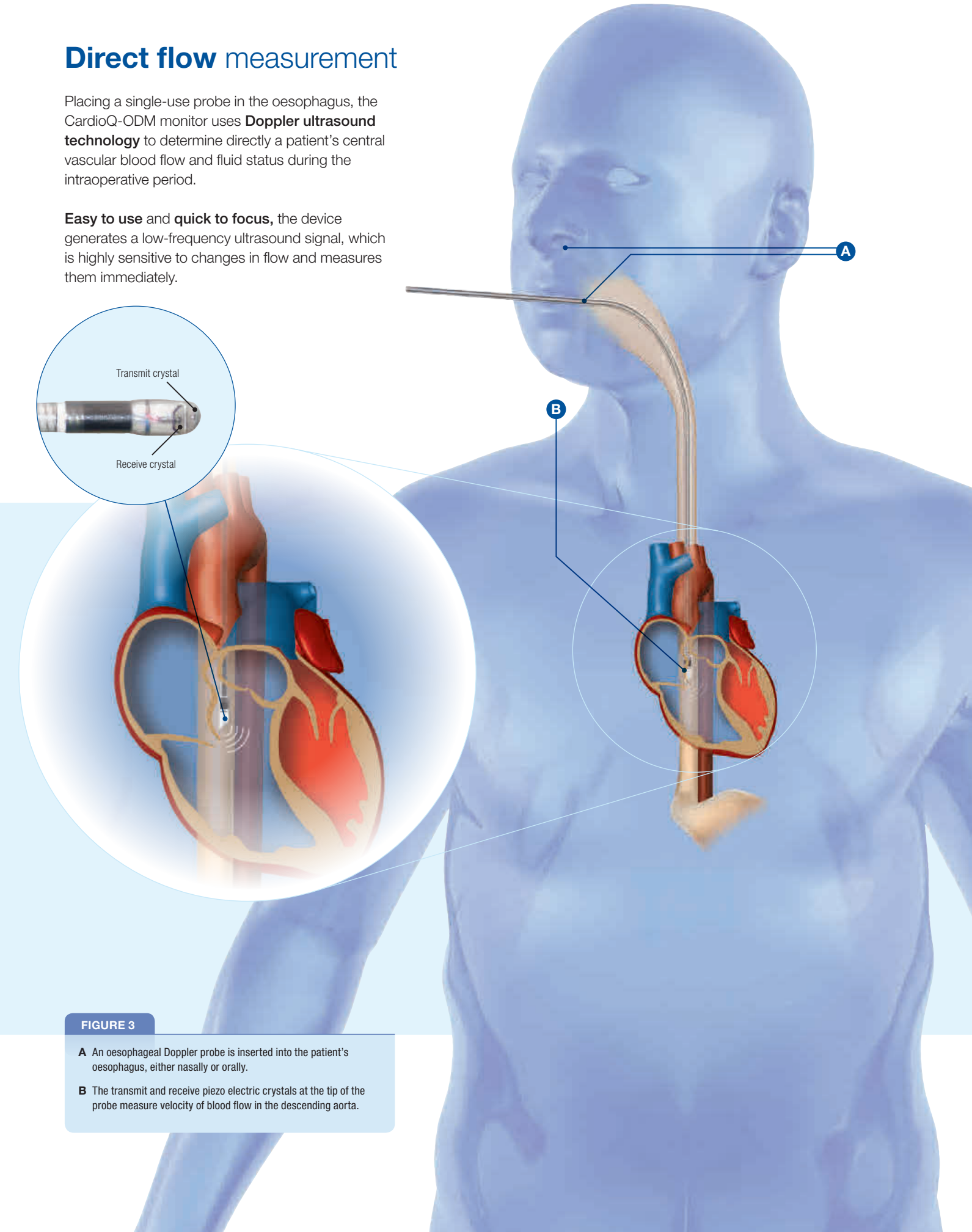


FIGURE 3

A An oesophageal Doppler probe is inserted into the patient's oesophagus, either nasally or orally.

B The transmit and receive piezo electric crystals at the tip of the probe measure velocity of blood flow in the descending aorta.

think Doppler.

> We will launch a national drive to get full implementation of ODM, or similar fluid management monitoring technology, into practice across the NHS.

Sir Ian Carruthers, OBE, (NHS Innovation, Health and Wealth Review 2011)

High Impact Innovation

The NHS Operating Framework 2012 and the NHS Innovation Health & Wealth Review 2011 named ODM as one of six **high impact innovations** and called for the widespread implementation of ODM for fluid management in surgery.

The recently launched Intraoperative Fluid Management Technologies (IOFMT) Adoption Pack from the **NHS National Technology Adoption Centre (NTAC)** – commissioned by the **Department of Health (DH)** – simplifies and facilitates the implementation process. For more information, visit **www.ntac.nhs.uk**

In March 2012, **NHS Supply Chain** awarded Deltex Medical a two-year contract to supply the CardioQ-ODM to the NHS.

By complying with the implementation requirements for these high impact innovations by April 2013, NHS organisations pre-qualify for the CQUIN payment scheme, worth **2.5%** of their revenue.

> Fluid Management Monitoring Technologies can reduce mortality rates for elective procedures, improve the quality of care for more than 800,000 patients a year, and save the NHS at least £400m annually.

Sir David Nicholson, Chief Executive of the NHS in England (NHS Innovation, Health and Wealth Review, 2011 - based on MTG3)

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Product Description

CardioQ-ODM Monitor (Product Code: 9051-7103)
For adult and paediatric use (down to 3kg with KDP72) in operating theatre and critical care. Managed care service and rental option available upon request.

Surgical Probes

DP6 Doppler Probe (Product Code: 9070-7001)
6-hour oral/nasal Doppler probe for patients under anaesthesia or full sedation.

DP12 Doppler Probe (Product Code: 9070-7003)
12-hour oral/nasal Doppler probe for patients under anaesthesia or full sedation.

I_2S Doppler Probe (Product Code: 9090-7012)
6-hour oral/nasal Doppler probe for anaesthetised, sedated and awake patients.

I_2P Doppler Probe (Product Code: 9090-7013)
24-hour oral/nasal Doppler probe for anaesthetised, sedated and awake patients.

Critical Care Probes

I_2C Doppler Probe (Product Code: 9090-7014)
72-hour oral/nasal Doppler probe for anaesthetised, sedated and awake patients.

DP240 Doppler Probe (Product Code: 9070-7005)
10-day oral/nasal Doppler probe for patients under anaesthesia or full sedation.

Paediatric Probes

KDP72 Doppler Probe (Product Code: 9081-7001)
72-hour paediatric oral Doppler probe 3kg and above.

When fluid management really matters, think Doppler

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