now the choice is yours ...

LiDCORapid$^2$

with Unity Software
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**LiDCOrapid**

**v2**

with Unity Software

LiDCOrapid\textsuperscript{v2} allows you to safely monitor any surgical patient, anywhere in the hospital, at any point in the care pathway.

From simple continuous non invasive blood pressure monitoring to advanced hemodynamic parameters and depth of anesthesia monitoring. You choose how, and where, to monitor your patients.

**features:**

Real-time continuous display of **non invasive blood pressure** (CNAP\textsuperscript{TM}) and level of consciousness (BIS\textsuperscript{TM}) unique to the LiDCOrapid\textsuperscript{v2} monitor platform.*

Patented user display with short and long term simultaneous display of consciousness and hemodynamic parameters during induction and maintenance of anesthesia.

**satisfying NICE recommendations:**

The LiDCOrapid\textsuperscript{v2} with Unity software satisfies National Institute for Health and Care Excellence (NICE) recommendations for fluid monitoring (MTG3) in patients undergoing major or high-risk surgery or other surgical patients in whom a clinician would consider using invasive cardiovascular monitoring.

When installed with the optional depth of anesthesia (BIS\textsuperscript{TM}) module LiDCOrapid\textsuperscript{v2} additionally satisfies NICE recommendations for depth of anesthesia monitoring in patients at higher risk of awareness during surgery or at higher risk of excessively deep anesthesia, and in all patients receiving total intravenous anesthesia (recommendation DG6).

“driving the PulseCO™ algorithm with arterial pressure data from the LiDCO CNAP™ module is as effective as when using an arterial line in monitoring fluid responsiveness in surgery patients”

Rigby et al., 2012; Biais et al., 2011 & Monnet et al., 2012

* BIS and Bispectral Index are trademarks of Covidien LP registered in the U.S. and foreign countries. CNAP\textsuperscript{TM} is a trademark of CNSystems.
multi parameter and non invasive monitoring

连续非侵入性血圧
和意识水平的监测

“BIS™ is a consciousness monitoring technology proven in rigorous prospective clinical studies to help clinicians reduce the incidence of awareness in adults”

Myles et al., 2004 & Kaplan et al., 2000
peri operative pathway

**1 pre-induction**

baseline hemodynamic values

Using either an arterial line or the non invasive CNAP™ module, the clinician is able to establish a hemodynamic baseline for pre-induction blood pressure, stroke volume and cardiac output values to assist in intra-operative targeting.

**non invasive CNAP™**

CNAP™ is easy to set up and use pre induction and throughout the case.

Continuous arterial blood measurement with CNAP™ dual finger cuff system scaled to the brachial artery with an arm cuff.

CNAP™ derived arterial waveform can reliably drive the PulseCO™ algorithm.

SVV, PPV, HR and ΔSV will be comparable to those derived from an invasive arterial line.

The monitor is designed to provide information that allows the user to optimise fluid and drug management immediately prior to induction and throughout surgery.

Preventing a significant debt of oxygen during high risk surgery can reduce complications and length of stay.

PulseCO™ ‘pulse power’ algorithm reliably tracks hemodynamic change in the presence of inotropes and vasoactive drugs.

www.lidco.com
The LiDCOrapid\textsuperscript{2} monitor displays hemodynamic parameters that guide fluid therapy and drug interventions which optimize blood flow in surgical patients.

Monitoring of circulatory blood volume guided by SVV\% / PPV\% and $\Delta$SV response can be achieved using an arterial line or non invasively with the LiDCO CNAP\textsuperscript{TM} module.

Intraoperative management using additional hemodynamic parameters such as fluid responsiveness, cardiac output and stroke volume is associated with reduced complications and length of stay.

**BIS\textsuperscript{TM}**

The BIS\textsuperscript{TM} system processes raw EEG signals to produce a single number, called the ‘Bispectral Index’ which correlates with the patient’s level of hypnosis or consciousness.

The anesthetist can now monitor both hemodynamics and level of consciousness on a single screen.

**3 recovery, PACU/HDU and ICU**

continuity of care

The patient can continue to be monitored in a high care area using an arterial line or non invasively via the CNAP\textsuperscript{TM}.

Hemodynamics and fluid management can continue to be optimised in the post op period.
LiDCOrapid\textsuperscript{v2} user display

designed for monitoring the high risk surgery patient

**long term trend**
Hemodynamic and BIS trends from the beginning of a procedure.

**short term trend**
Hemodynamic and BIS trends for the last 2 minutes, showing the immediate response to an intervention.

**event response**
The LiDCOrapid\textsuperscript{v2} window can show the stroke volume response to a fluid challenge.

**preload response**
This window displays preload response values or volume status indicators of: Pulse Pressure Variation (PPV\%) and Stroke Volume Variation (SVV\%).
LiDCOrapid\textsuperscript{v2} CNAP\textsuperscript{TM} module provides a non invasive arterial waveform that can be analysed by the PulseCO\textsuperscript{TM} algorithm.

dual finger cuff sensor
Generates a continuous blood pressure waveform for the analysis and display of beat-to-beat pressure and hemodynamic parameters.

calibrated pressure values
Uses the included oscillometric arm cuff to provide an absolute measure of brachial blood pressure, or the user can input the known blood pressure values from the patient’s existing brachial cuff measurements.

**CNAP\textsuperscript{TM} when compared to the arterial line**

The LiDCO CNAP\textsuperscript{TM} module provides a continuous non invasive arterial waveform that can be analysed by the PulseCO\textsuperscript{TM} algorithm to derive arterial pressure and the following hemodynamic parameters: HR, SV, SVV%/PPV%, CO & SVR.

Driving the PulseCO\textsuperscript{TM} algorithm with arterial pressure data from the LiDCO CNAP\textsuperscript{TM} module is as effective as when using an arterial line in monitoring fluid responsiveness in surgery patients.
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non invasive or minimally invasive continuous hemodynamic monitoring from an arterial waveform and level of consciousness

**BIS™**

BIS™ technology monitors the state of the brain through acquisition of EEG signals, and may provide insight into the patient-specific effects of anesthesia on the brain. *Gan et al., 1997*

Prospective, randomized studies have shown reductions in the use of certain primary anesthetic agents when titrated to the BIS™ Index. *Song et al., 1997 & Luginbuhl et al., 2003*

BIS™ is a consciousness monitoring technology proven in rigorous prospective clinical studies to help clinicians reduce the incidence of awareness in adults. *Myles et al., 2004; Ekman et al., 2004 & Kaplan et al., 2000*

**CNAP™**

Provides a continuous non invasive blood pressure measurement with a dual finger cuff scaled to the brachial arterial pressure

The CNAP™ derived arterial waveform can be used with the PulseCO™ algorithm to monitor fluid responsiveness in surgical patients

Hemodynamic changes and fluid responsiveness parameters are comparable to those derived from an arterial line

**LiDCOrapid v2** is easy to set up and use

Arterial pressure can be derived from all types of invasive pressure transducers - no need to use a specific disposable.

When used non invasively, the finger cuffs are designed to be applied quickly and effectively in any clinical setting.

Therefore consistent and reliable information to guide clinical interventions can be achieved by any clinician, anywhere in the hospital.

*www.lidco.com*
The PulseCO™ algorithm has been unchanged since launch in 2001 and its performance explored in the following patient populations:

- General surgery patients (Heller et al., 2002)
- Hyperdynamic liver transplantation patients (Costa et al., 2007)
- Off-pump cardiac surgery patients (Missant and Wouters, 2007)
- On-pump cardiac surgery (Wilde et al., 2007; Marquez et al., 2008)
- Post-operative care (Pittman et al., 2005; Hamilton, 2002)
- General intensive care patients (Smith et al., 2005)
- Heart failure patients (Kemps et al., 2009)
- High risk obstetric patients (Dyer et al., 2011)

The PulseCO™ algorithm has been proven to accurately track cardiac output after changes in inotropes and administration of vasopressors/vasodilators that alter systemic vascular resistance.

### Multi modal monitoring in elderly high risk vascular patients:

### Open liver resection:

### Post operative surgical Goal Directed Therapy:

### Peri-operative GDT study (intra and post op):

### Shock patients in an ICU setting:

### High-risk abdominal & bariatric surgery:

### Laparoscopic bariatric surgery:

### Oesophagectomy:
fluid challenge protocol

Set-up LiDCOrapid®

Give fluid challenge

SV increase >10%

Re-check SV value every 15 minutes

Has SV decreased >10% from last fluid challenge?

NO

YES

MAINTAIN:
SaO₂ >94%, Hb 8-10 g/dL,
Temp 37°C, MAP 60-100 mmHg

Warning: The above fluid protocol is a simplified schematic – each institution should only give fluids according to their own internally approved fluid administration protocols.

Adult fluid challenge guidelines:
Administer a 250ml fluid bolus <5 mins intravenously
1. Use wide bore cannula if available
2. Administer via a 50ml syringe and 3-way tap

The use of intraoperative fluid management technologies are recommended from the outset in the following types of cases:

Major surgery with a 30 day mortality rate of >1%
Major surgery with an anticipated blood loss of greater than 500ml
Major intra-abdominal surgery
Intermediate surgery (30 day mortality >0.5%) in high risk patients (age >80 years, history of LVF, MI, CVA or peripheral arterial disease)
Unexpected blood loss and/or fluid loss requiring >2 litres of fluid replacement
Patients with ongoing evidence of hypovolaemia and or tissue hypoperfusion (e.g. persistent lactic acidosis)

Preload Response

Stroke volume increases by more than 10% with a 250ml fluid challenge over 5 minutes
Stroke volume increases by less than 10% with a 250ml fluid challenge over 5 minutes

A
B
C
D
Fluid responsive
Fluid non responsive

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LiDCO’s PulseCO™ algorithm papers


Marquez J, McCurry K, Severyn D, Pinsky M. Ability of pulse power, esophageal doppler and arterial pulse pressure to estimate rapid changes in stroke volume in humans. (2008) Critical Care Medicine, 36(11) 3001 – 3007


CNAP™ non invasive blood pressure publications


Level of consciousness BIS™ publications


Depth of anaesthesia monitors – Bispectral Index (BIS™), E-Entropy and Narcotrend-Compact M. Issued: November 2012. NICE diagnostics guidance #6