# Hydration by the Numbers: Role of LVEDP in Safeguarding Patients with Kidney Disease and/or Heart Failure

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## Description:

This innovative application of left ventricular end-diastolic pressure (LVEDP) guided fluid administration focuses on improving outcomes for patients with complex conditions such as heart failure (HF) and chronic kidney disease (CKD) during and post-heart cath. This trial aims to address the unique challenges these patients face, particularly in preventing acute kidney injury (AKI) and fluid volume overload (FVO).

This session delves into the genesis, implementation, and outcomes of a pioneering protocol that personalizes hydration strategies based on LVEDP readings. Learn how this evidence-based practice enhances patient safety, reduces contrast induced nephropathy (CIN) incidents, and sets new standards in patient care. Through real-world examples, discover the transformative potential of integrating precise hemodynamic measurements into clinical decision-making, ensuring optimal hydration and safeguarding the renal and cardiac health of vulnerable patients.

## Problem:

CKD patients with heart failure face increased risks of contrast-induced nephropathy (CIN) and fluid overload post-catheterization. The lack of universal, hemodynamic-tailored fluid management protocols highlights a pressing need for evidence-based strategies to mitigate these complications and enhance patient care.

## Measurement:

Pre- and post-protocol implementation data were analyzed to measure incidences of CIN and FVO, utilizing electronic health records, labs, and diagnostic measurements for accuracy and efficiency in evaluation.

## Analysis:

Our analysis utilized statistical comparison of pre- and post-implementation data on CIN and FVO incidences, employing standard deviation and variance measures to assess the protocol's impact on patient outcomes within the Cath lab setting.

## DATA Analysis:

National, public studies have demonstrated that high-risk populations (having 1 or more co-morbidities such as CKD, DM, and HF) have an incidence rate of 15-30% with an in-hospital mortality rate up to 10 times higher compared to patients without CIN.

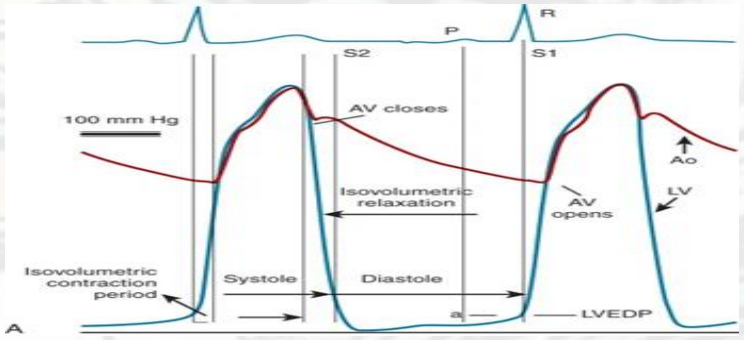
Clinical Assessment, Reporting, and Tracking Program (CART) – National quality initiative for VA cardiac catheterization laboratories

- National VA cohort of 115,633
- Patients with LHC between 1/2009 to 10/2013 within 71 medical centers.
  - AKIN Stage 1: 16,036 or 13.9% (Cr >/= 150% or >0.3 mg/dl increase)
  - AKIN Stage 2: 2,017 or 1.7% (Cr > 200%)
  - CIN outcomes, 13,763 or 11.9%. (Cr >/= 0.5 mg/dl increase)

## Implementation:

We initiated the LVEDP-guided protocol by educating our team, adjusting procedural guidelines, and employing real-time hemodynamic data for patient-specific fluid management, fostering interdisciplinary collaboration for improved patient outcomes.

Example of LVEDP tracing during LHC




## Results/Discussion:

The implementation of the LVEDP-guided fluid management protocol led to a significant reduction in CIN and FVO events, demonstrating its effectiveness in providing exceptional care to complex patient populations. This approach has proven vital for improving patient outcomes and safety in and outside of the Cath lab setting.

| LVEDP (mmHg) | Infusion Rate (ml/kg/hr) | Duration (hours) |
|---|---|---|
| <13 | 5 | 4 |
| 13-18 | 3 | 4 |
| >18 | 1.5 | 4 |

## References:


1. Brar, S. S., Aharonian, V., Mansukhani, P., Moore, N., Shen, A. Y., Jorgensen, M., ... & Kane, K. (2014). Haemodynamic-guided fluid administration for the prevention of contrast-induced acute kidney injury: the POSEIDON randomised controlled trial. *The Lancet*, *383*(9931), 1814-1823.
2. Matheny, M.E. (n.d.). National Surveillance of Acute Kidney Injury Following Cardiac Catheterization.
3. Mehta RL et al., 2002: This study found that CIN occurred in 14.5% of patients with pre-existing renal insufficiency undergoing cardiac catheterization.
4. Rudnick MR et al., 1995: This research reported a 3.3% incidence of CIN in patients undergoing coronary angiography.
5. Solomon R et al., 2006: In a cohort of patients with chronic kidney disease undergoing cardiac catheterization, the incidence of CIN was reported to be around 13%.
6. Themes, U. (2020, February 21). *Invasive hemodynamics*. Thoracic Key. https://thoracickey.com/invasive-hemodynamics

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