EE319

Economic evaluation of Dynamic Coronary Roadmap (DCR) in Percutaneous Coronary Intervention (PCI)

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Introduction

There is a rise in the global incidence of high-risk patients undergoing Percutaneous Coronary Intervention (PCI) procedures. During these procedures, iodine contrast media is used to visualize the coronary arteries. This media poses a risk to renal health, potentially leading to contrast-induced acute kidney injury (CI-AKI) post-procedure. Dynamic Coronary Roadmap (DCR) is a technology that provides motion-compensated, real-time visualization of coronary arteries. With DCR, less iodinated contrast is required and subsequently the risk of CI-AKI is reduced.

Objectives

This economic evaluation aims to assess the affordability and value of DCR. A budget impact model was subsequently developed to examine the costs to the hospital of implementing DCR from a US provider perspective.

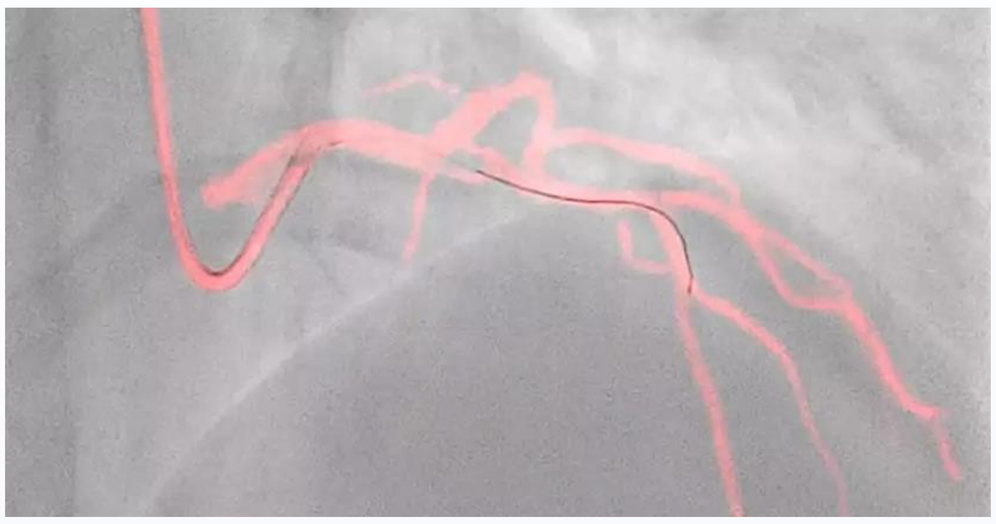

Fig 1. Visualization of coronary arteries with DCR

Methods

A budget impact model was developed to compare the use of DCR versus no DCR from the perspective of a U.S. hospital. The number of PCI procedures per hospital was obtained from Definitive U.S. healthcare data. Patient distribution across various iodine contrast volume categories was determined using data from a large registry study (Tsai TT et al., 2014). Iodine contrast volumes were categorized into the following buckets: ‘<100 mL’, ‘100 mL – 199 mL’, ‘200 mL – 299 mL’, and ‘>299 mL’, with the associated risk of CI-AKI defined according to Mehran et al., 2021. A lower iodine contrast volume was associated with a reduced risk of CI-AKI.

DCR has been shown to reduce iodine contrast volume by 28.8% (Hennessey B et al., 2024). This reduction was used to redistribute patients into lower iodine contrast volume categories in the DCR arm, resulting in a lower overall risk of CI-AKI compared to the no DCR arm due to the higher proportion of patients in the lower-risk buckets.

The cost impact of CI-AKI was calculated based on the additional length of stay associated with CI-AKI, multiplied by the bed day cost. Bed day cost data was sourced from WHO 2010 data and adjusted for inflation to 2023 using OECD Healthcare Expenditure data, resulting in an estimated cost of $1,436 per bed day. The additional length of stay due to CI-AKI was derived from Zarbock et al., 2023, which reported an average increase of 4 days.

Results

The cost offset of the DCR system depends on several factors. This includes the risk and cost of CI-AKI, the volume of PCI procedures performed, and the time horizon. For a cohort of 1,000 PCI procedures, implementing the DCR system can result in cost savings of approximately $146,000 and a 16% reduction in CI-AKI cases over a 5-year period. These savings are primarily due to decreased length of stay, emphasizing the economic value of implementing DCR in PCI procedures.

	No DCR	With DCR	Difference
Total AKI costs	$1,424,512	$1,200,496	-$224,016
DCR cost	N/A	$78,000	$78,000
Total costs	$1,424,512	$1,278,496	**-$146,016**

16%

Reduction in AKIs with DCR: 39 patients less

Disclaimer: Contrast volume is not the sole parameter to influence the risk of AKI, although it is the key modifiable one

Conclusion

Hospitals that adopt the DCR platform can achieve significant cost savings compared to the standard approach without DCR, while simultaneously enhancing patient outcomes by reducing the incidence of CI-AKI.

References

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Inpatient Codes
0270346, 027034Z, 02703D6, 02703DZ, 02703Z6, 02703ZZ, 0270446, 027044Z, 02704D6, 02704DZ, 02704Z6, 02704ZZ, 0271346, 027134Z, 02713DZ, 02713Z6, 02713ZZ, 0271446, 027144Z, 02714D6, 02714DZ, 02714Z6, 02714ZZ, 0272346, 027234Z, 02723D6, 02723DZ, 02723Z6, 02723ZZ, 0272446, 027244Z, 02724D6, 02724DZ, 02724Z6, 02724ZZ, 0273346, 027334Z, 02733D6, 02733DZ, 02733Z6, 02733ZZ, 0273446, 027344Z, 02734D6, 02734DZ, 02734Z6, 02734ZZ, 02C03ZZ, 02C13ZZ, 02C23ZZ, 02C33ZZ, 02C03Z6, 02C04Z6, 02C04ZZ, 02C13Z6, 02C14Z6, 02C14ZZ, 02C23Z6, 02C24Z6, 02C24ZZ, 02C33Z6, 02C34Z6, 02C34ZZ,4A023N6, 4A023N7, 4A023N8

Outpatient Codes
92920, 92921, 92924, 92925, 92928, 92929, 92933, 92934, 92937, 92938, 92941, 92943, 92944, 93454, 93455, 93456, 93457, 93458, 93459, 93460, 93461

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