Policy Brief

Cost-Effectiveness Analysis of Implantable Cardioverter-Defibrillator (ICD) for Secondary Prevention of Sudden Cardiac Death in Indian Adults.

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Recommendations:

- Based on available evidence, use of implantable cardioverter defibrillator for secondary prevention of sudden cardiac death is a cost-effective strategy for Indian adults surviving sustained ventricular tachycardia or fibrillation.

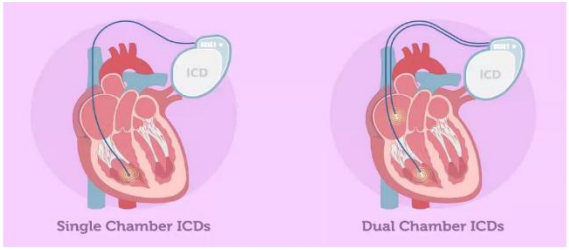
Key Findings:

- Economic evaluation using high-quality evidence show that an additional cost of INR 2,04,057 would be required to gain one QALY (Quality Adjusted Life Year). This is 0.88 times the cost effectiveness threshold of GDP per capita of India (2.31 lakhs per QALY as in 2025-26).
- The upfront cost of reimbursing ICDS for PMJAY beneficiaries comes to around 33 cores INR at the current uptake of 5%. The net budget impact at 1 year and 5 years are INR 27 and 24 crores, respectively.

Background

- An ICD (Implantable Cardioverter-Defibrillator) is an implantable medical device that continuously monitors the heart's electrical activity, delivering life-saving shocks to restore a normal heart rhythm in case of potentially fatal arrhythmias.
- ICDs have demonstrated efficacy in secondary prevention of sudden cardiac death among patients who have survived life-threatening arrhythmias, and have been shown to improve overall survival rates through the prevention of fatal arrhythmias.
- ICDs are not currently covered under the AB-PMJAY health benefit packages. This HTA analysed the cost-utility of ICD for secondary prevention of sudden cardiac deaths in Indian adults, and the budget impact of reimbursing ICD for the PMJAY cohort.

Implantable Cardioverter-Defibrillator (ICDs)



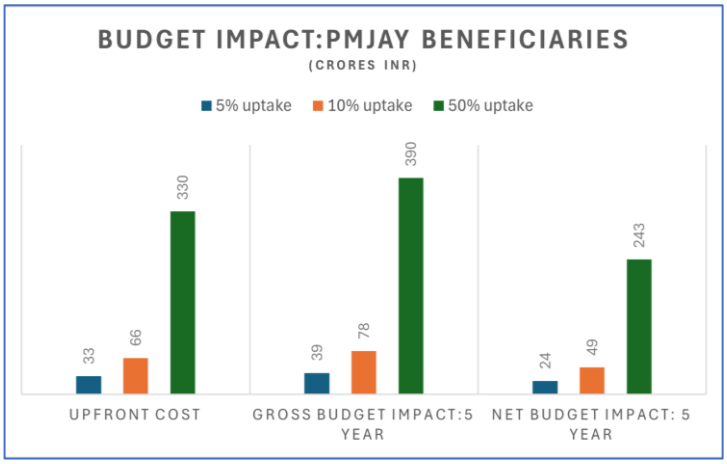
An ICD is an implantable medical device that continuously monitors the heart's electrical activity, delivering life-saving shocks to restore a normal heart rhythm in case of potentially fatal arrhythmias. It cost ₹2,06,250 during assessment.

PICO	Description of the components of PICO
Population	Indian adults who survived sustained ventricular tachycardia or fibrillation, making them eligible for secondary prevention with ICDs
Intervention	Implantable cardioverter defibrillator (ICDs)
Comparator	Conventional medical treatment (CMT)
Outcome	QALYs | Mortality | ICER

Strategy	Cost (₹) (Lacs)	Incremental Cost (₹) (Lacs)	Effectiveness	Incremental Effectiveness	ICER (₹) (Lacs)	ICER-GDP Ratio
CMT	1.94		5.560			0.88
ICD	**4.19**	**2.25**	**6.660**	**1.100**	**2.04**	

Uptake rate	Estimated number
5% (Current)	1,430
10%	2,859
20%	5,718
50%	14,295
100%	28,590

Estimated number of beneficiaries that will avail ICDs at different uptake rates.



Budget impact analysis showing upfront cost, gross budget impact, and net budget impact of ICDs over CMT at different uptake rates in the PMJAY cohort

Budget Impact Analysis:

- Assuming an average cost of ₹140,000 per device, the upfront cost of reimbursing ICDs for PMJAY beneficiaries comes to around 33 crores INR at the current uptake rate of 5% (~1400 individuals). The net budget impacts at 1yr and 5yr are INR 27 and 24 crores, respectively.
- Higher uptake rates will lead to more significant cost increases. Upfront cost at 10% and 50% uptake would be around 66 and 330 crores INR, respectively.

Conclusion:

- Cost Effectiveness: The ICER/ QALY gained is 2.04 lacs i.e. 0.88 GDP Per Capita suggests that ICD is cost-effective.
- The inclusion of Implantable cardioverter defibrillator (ICDs) in PM-JAY is estimated to incur an additional cost of ₹ 27 crores.

References

1. *Pannone L, Falasconi G, Cianfanelli L, Baldetti L, Moroni F, Spoladore R, et al. Sudden Cardiac Death in Patients with Heart Disease and Preserved Systolic Function: Current Options for Risk Stratification. J Clin Med. 2021 Jan;10(9):1823. National Family Planning Programme [Internet]. Hum Do| Family Planning. 2017 [cited 2019 Feb 1]. Availablefrom: https://humdo.nhp.gov.in/about/national-fp-programmes/*
2. *Connolly SJ, Hallstrom AP, Cappato R, Schron EB, Kuck KH, Zipes DP, et al. Meta-analysis of the implantable cardioverter defibrillator secondary prevention trials. AVID, CASH and CIDS studies. Antiarrhythmics vs Implantable Defibrillator study. Cardiac Arrest Study Hamburg . Canadian Implantable Defibrillator Study. Eur Heart J. 2000 Dec;21(24):2071-8.Hohmann H, Creinin MD, The contraceptive implant. Clin Obstet Gynecol. 2007 Dec;50(4):907-17.*
3. *Chia YMF, Teng THK, Tan ESJ, Tay WT, Richards AM, Chin CWL, et al. Disparity Between Indications for and Utilization of Implantable Cardioverter Defibrillators in Asian Patients With Heart Failure. Circ Cardiovasc Qual Outcomes. 2017 Nov;10(11):e003651HTA in India A Manual by DHR MoHFW. Oct 2018*
4. *Singh SN, Fletcher RD, Fisher SG, Singh BN, Lewis HD, Deedwania PC, et al. Amiodarone in Patients with Congestive Heart Failure and Asymptomatic Ventricular Arrhythmia. N Engl J Med. 1995 July 13;333(2):77-82.*