ELECTRA

4-5 DÉCEMBRE 2025

VILLA M. - MARSEILLE I FRANCE

19èmes journées françaises pratiques de rythmologie & de stimulation cardiaque

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Session Bloc opératoire et IDE – Paramédical

Repérer le patient à risque et anticiper les complications

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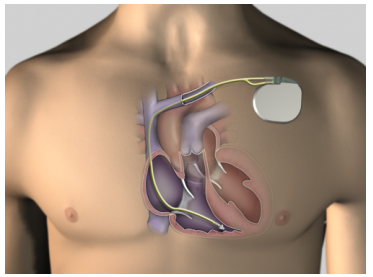

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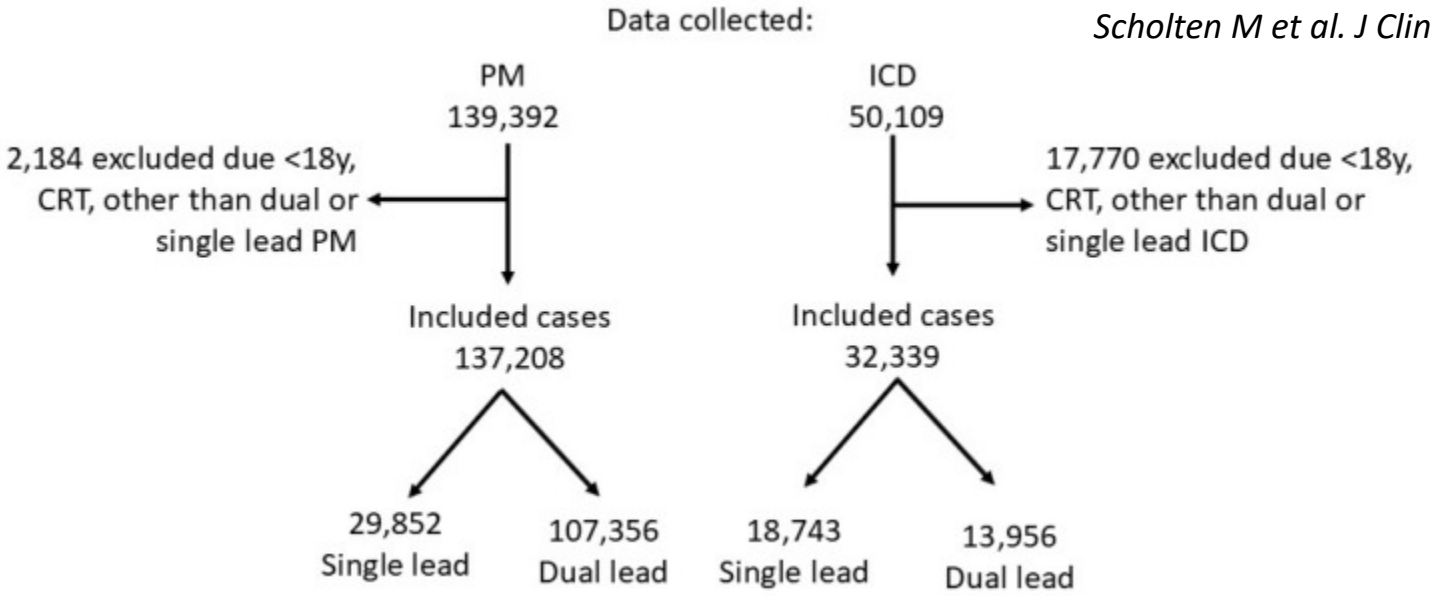
Liens d'intérêts

- ☑ Je déclare les liens d'intérêt potentiel suivants :

- Consultant : Biotronik France, Medtronic France
- Honoraires : AstraZeneca, Pfizer

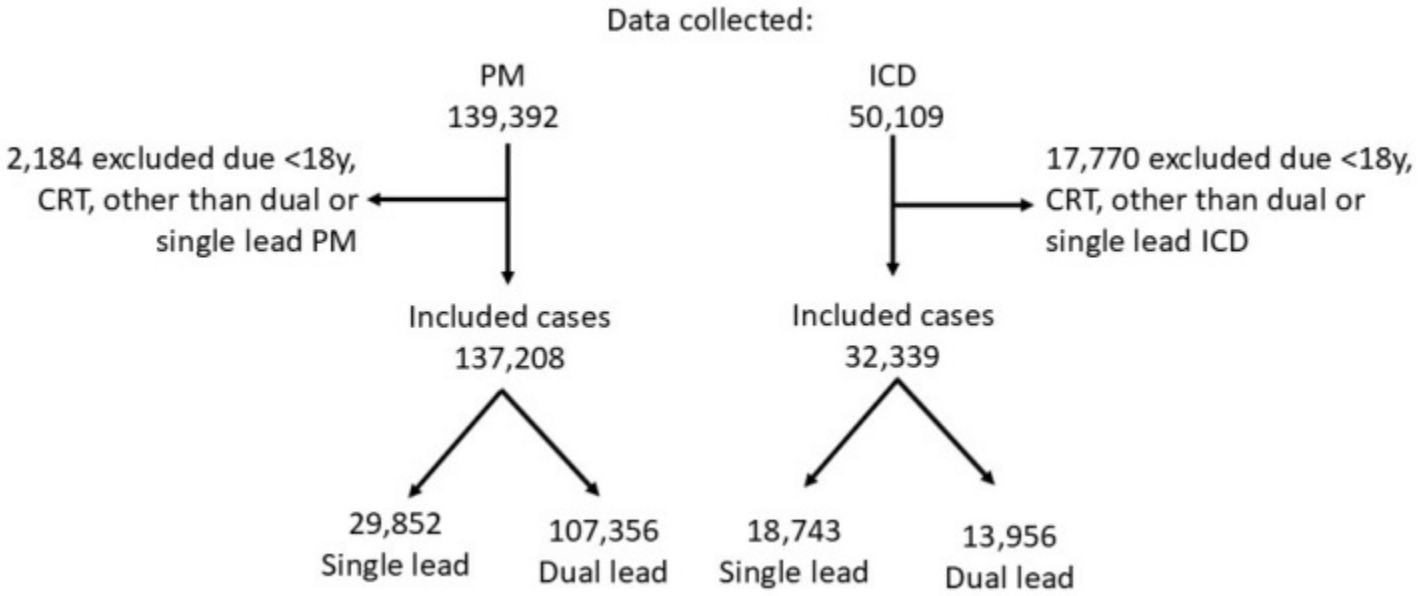
« Le contenu et/ou les opinions exprimées lors de cette présentation ont été réalisés en toute indépendance »

Scholten M et al. J Clin Med 2025 May 6; 14(9): 3203.doi



Pacemaker		Perioperative Complications	
	Total	**No**	**Yes**
Single Lead	29,852 (21.76%)	29,002 (97.15%)	850 (2.85%)
Dual Lead	107,356 (78.24%)	103,844 (96.73%)	3512 (3.27%)
Total	137,208	132,846 (96.83%)	4362 (3.17%)

ICD		Perioperative Complications	
	Total	**No**	**Yes**
Single Lead	18,743 (57.96%)	18,482 (98.61%)	261 (1.39%)
Dual Lead	13,596 (42.04%)	13,398 (98.54%)	198 (1.46%)
Total	32,339	31,880 (98.58%)	459 (1.42%)



PM—Discharge Reason	Perioperative Complication			
	All	No	Yes	*p*
Discharge/Transfer, *n* (%)	134,877 (98.3)	130,712 (96.9)	4165 (95.5)	<0.001
Mortality, *n* (%)	2331 (1.7)	2134 (1.6)	197 (4.5)	<0.001

ICD—Discharge Reason	Perioperative Complication			
	All	No	Yes	*p*
Discharge/Transfer, n (%)	31.734 (99.5)	31.734 (99.5)	441 (96.1)	<0.001
Mortality, *n* (%)	164 (0.5)	146 (0.5)	18 (3.9)	<0.001

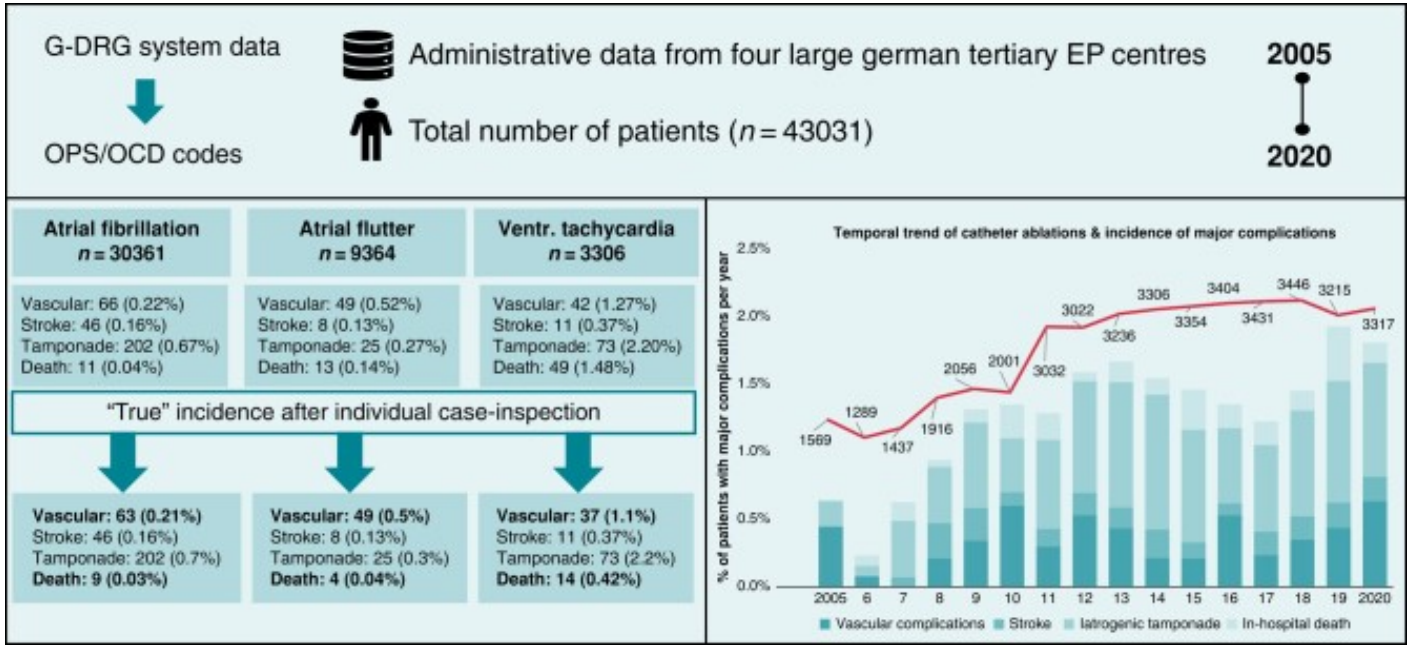
Scholten M et al. J Clin Med 2025 May 6; 14(9): 3203.doi

ESC European Society of Cardiology
Europace (2024) **26**, 1–12
https://doi.org/10.1093/europace/euad361

CLINICAL RESEARCH

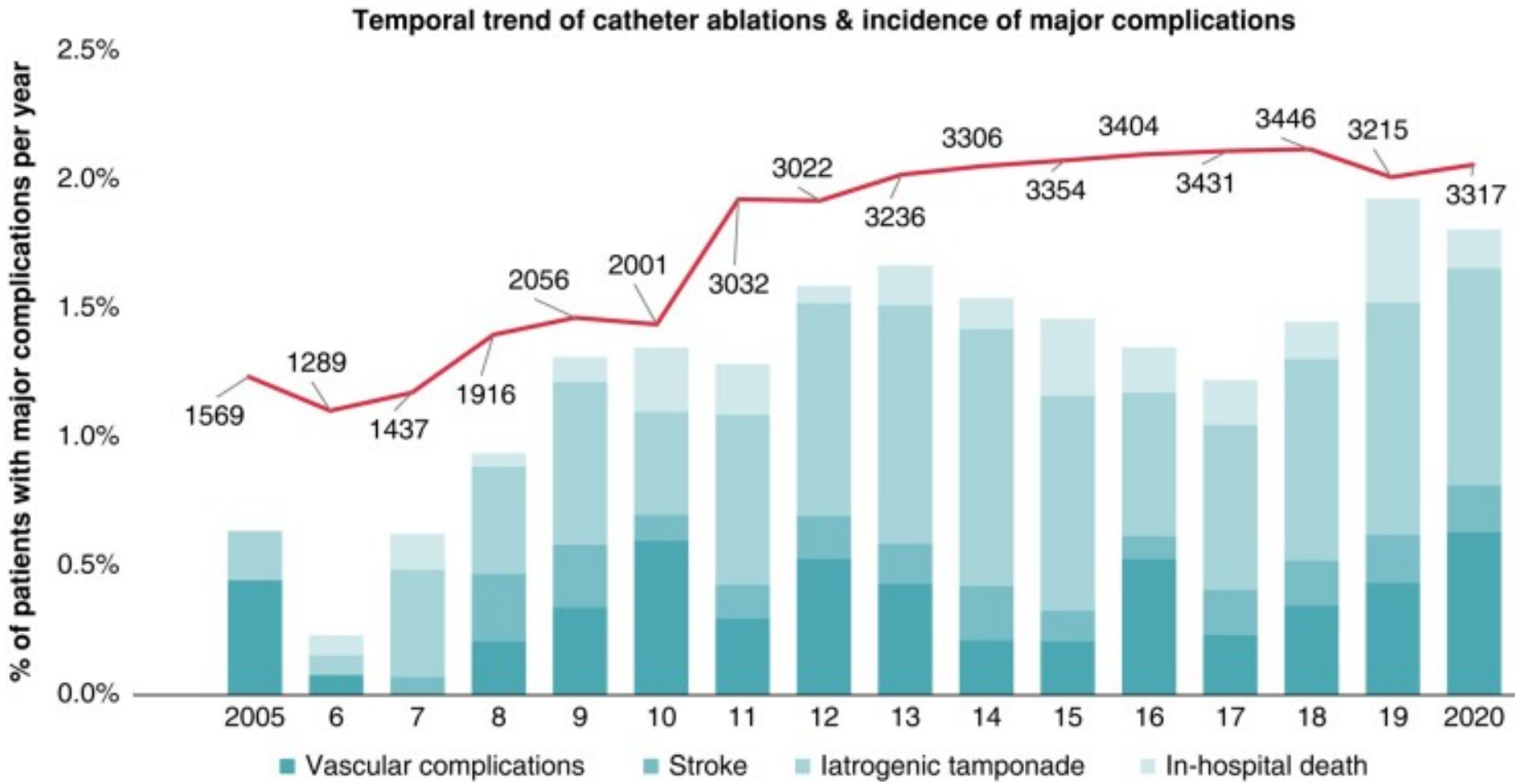
Major in-hospital complications after catheter ablation of cardiac arrhythmias: individual case analysis of 43 031 procedures

Lars Eckardt [1]*†, Florian Doldi [1†], Omar Anwar [2,3], Nele Gessler [2,3], Katharina Scherschel [4], Ann-Kathrin Kahle [4], Aenne S. von Falkenhausen [5,6], Raffael Thaler [5,6], Julian Wolfes[1], Andreas Metzner [3,7], Christian Meyer [4], Stephan Willems [2,3], Julia Köbe [1], Philipp Sebastian Lange [1], Gerrit Frommeyer [1], Karl-Heinz Kuck [2,3], Stefan Kääb [5,6], Gerhard Steinbeck[5,6†], and Moritz F. Sinner [5,6†]



Major in-hospital complications after catheter ablation of cardiac arrhythmias: individual case analysis of 43 031 procedures

Europace (2024) **26**, 1–12



Identification du patient à risque
Quelles procédures ? Profil de risque différent ?

- **Risques liés à la procédure : urgence ou programmée ?**
  - **PM et DAI : nombre d'implantations sans cesse ↑**
    - Primo-implantation, remplacement de boîtier, extraction…
    - Simple, double ou triple chambre
    - Classique, sans sonde ou voies de conduction
  - **Ablations : nombre de procédures sans cesse ↑**
    - Abords vasculaires (ATCD de chirurgie ou RT ?) → risque d'hématome, fistule AV et thrombose aigüe
    - Cavités droite ou gauche ? → risque de tamponnade++, risque TE, risque fistule atrio-oesophagienne
    - Proche des voies de conduction ? (RIN, Kent parahissien…) → risque de BAV
- **Risques liés au profil clinique : HMD stable ou instable ?**
  - **Enfants ou séniors ? → pas de limite d'âge en théorie**
  - **Comorbidités ? → IR ou respiratoire, cancer…, traitement AAP ou ACO**
  - **Risque septique ↑ → prothèses rythmiques, valves, immunodépression…**
- **Risques liés à l'environnement : adaptée à la procédure ?**

Complications liées à la procédure

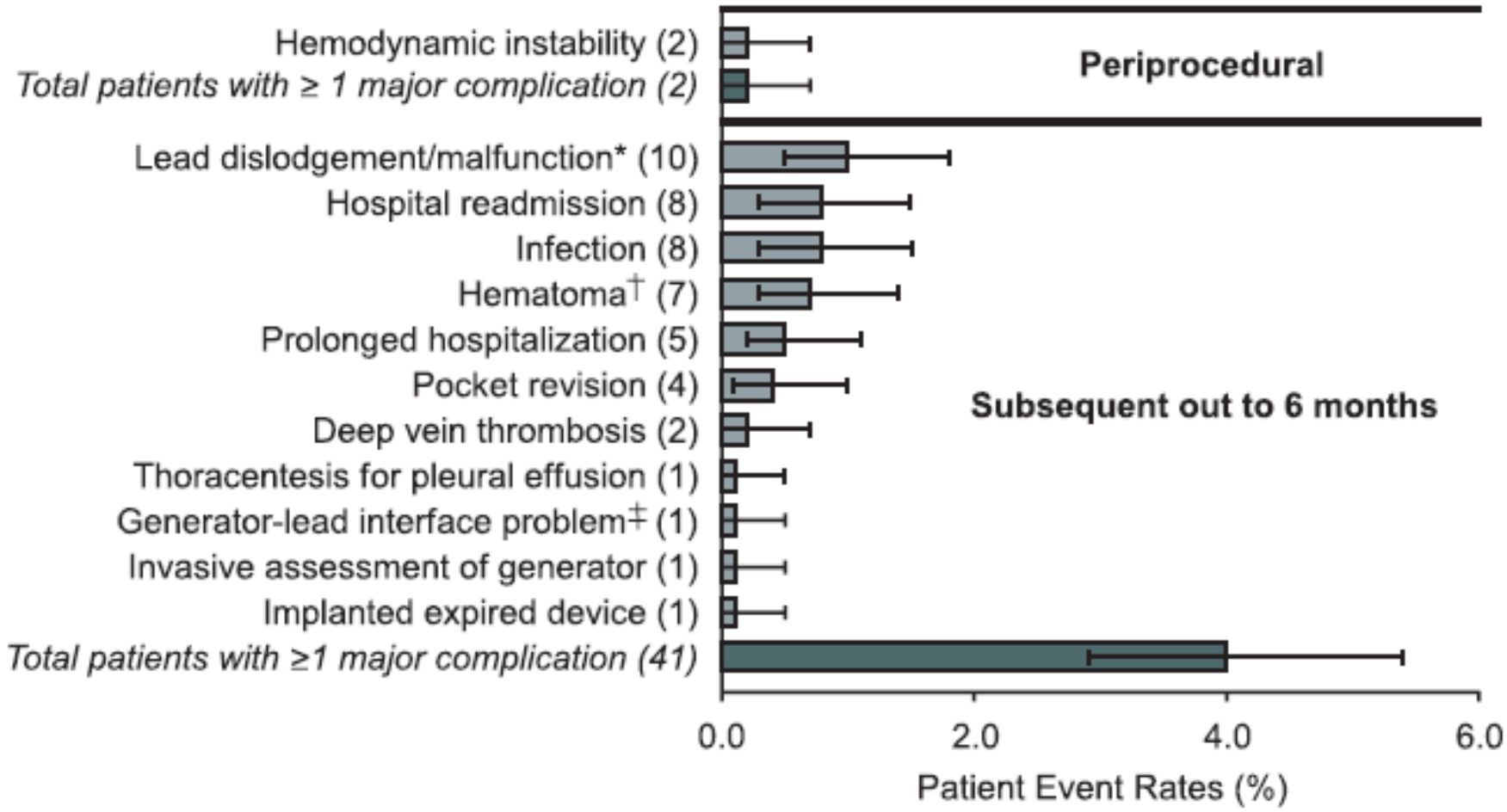
Lesquelles ? Peut-on les anticiper ?

Complications lors de remplacements

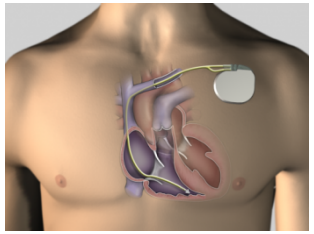
Aucune procédure en rythmologie n'est simple !

- 1031 patients
- 25% des implantations de DAI sont des remplacements de boitiers
- Jusqu'à **4% de complications majeures** lors des remplacements et **14% si reprise de sonde ou up-grading**

(REPLACE registry, Circulation 2010)



Complications précoces
Lesquelles ? Peut-on les anticiper ?



Single-Chamber ICD	(n = 27 819)
Any complication	613 (2.2)
Major complication	246 (0.9)

Dual-Chamber ICD	(n = 44 506)
Any complication	1489 (3.3)
Major complication	647 (1.5)

	Total, No. (%) (N = 111 293)
Hematoma	1243 (1.1)
Lead dislodgement	1156 (1.0)
Pneumothorax	548 (0.5)
Cardiac arrest	350 (0.3)
Coronary venous dissection	162 (0.1)
Drug reaction	121 (0.1)
Hemothorax	104 (0.1)
Cardiac perforation	95 (0.1)
Pericardial tamponade	86 (0.1)

Association of physician certification and outcomes among patients receiving an implantable cardioverter-defibrillator.Curtis JP, Luebbert JJ, Wang Y, et al. *JAMA 2009; 301: 1661-1670*

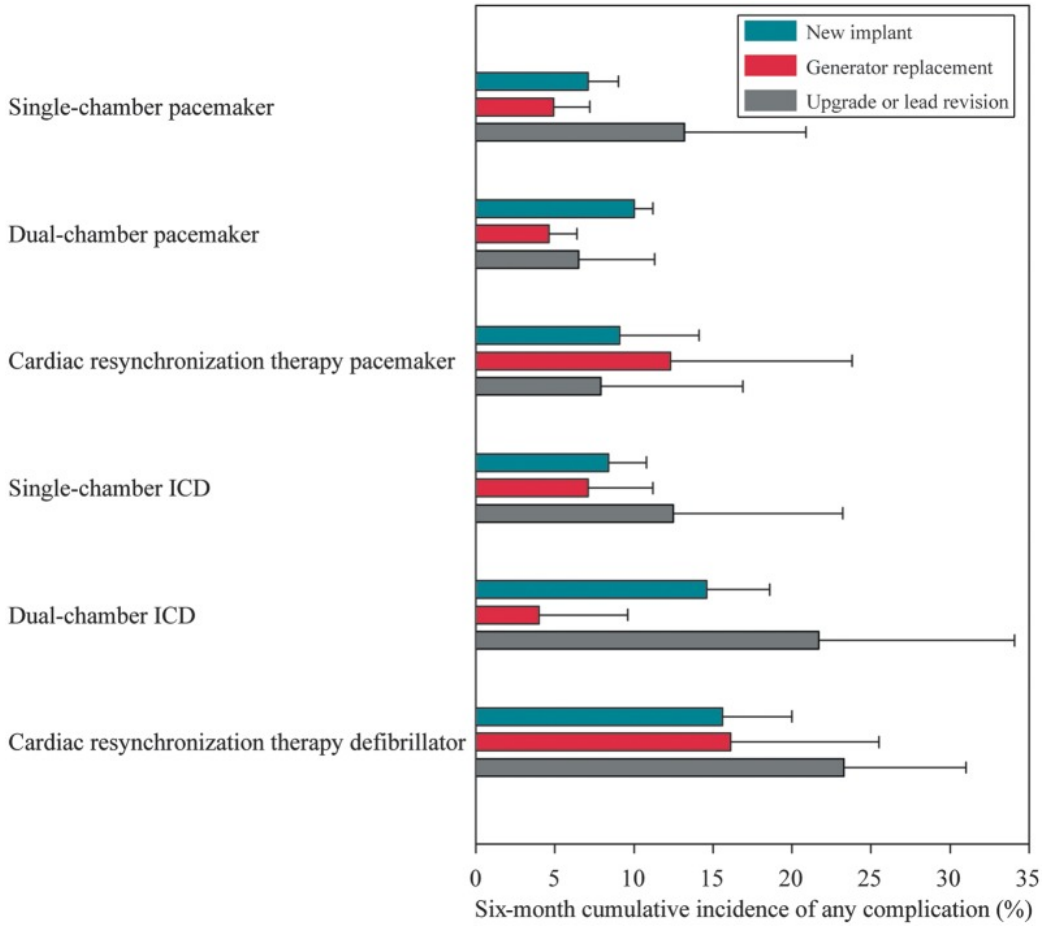
Complications after cardiac implantable electronic device implantations: an analysis of a complete, nationwide cohort in Denmark

Rikke Esberg Kirkfeldt[1,2*], Jens Brock Johansen[2,3], Ellen Aagaard Nohr[4], Ole Dan Jørgensen[2,5], and Jens Cosedis Nielsen[1]

European Heart Journal (2014) **35**, 1186–1194

5918 pts; 9.5% complications

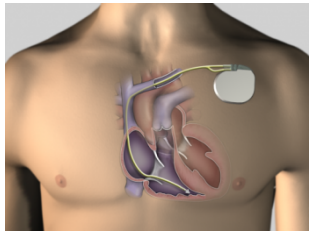
- **5.6% majeures (n = 329)**
- **4.2% mineures (n = 250)**
- **2.7% liées aux sondes (n = 160)**
- **0.8% infections (n = 49)**
- **2.5% hématomes (n = 148)**
- **1.6% pneumothorax (n = 90)**

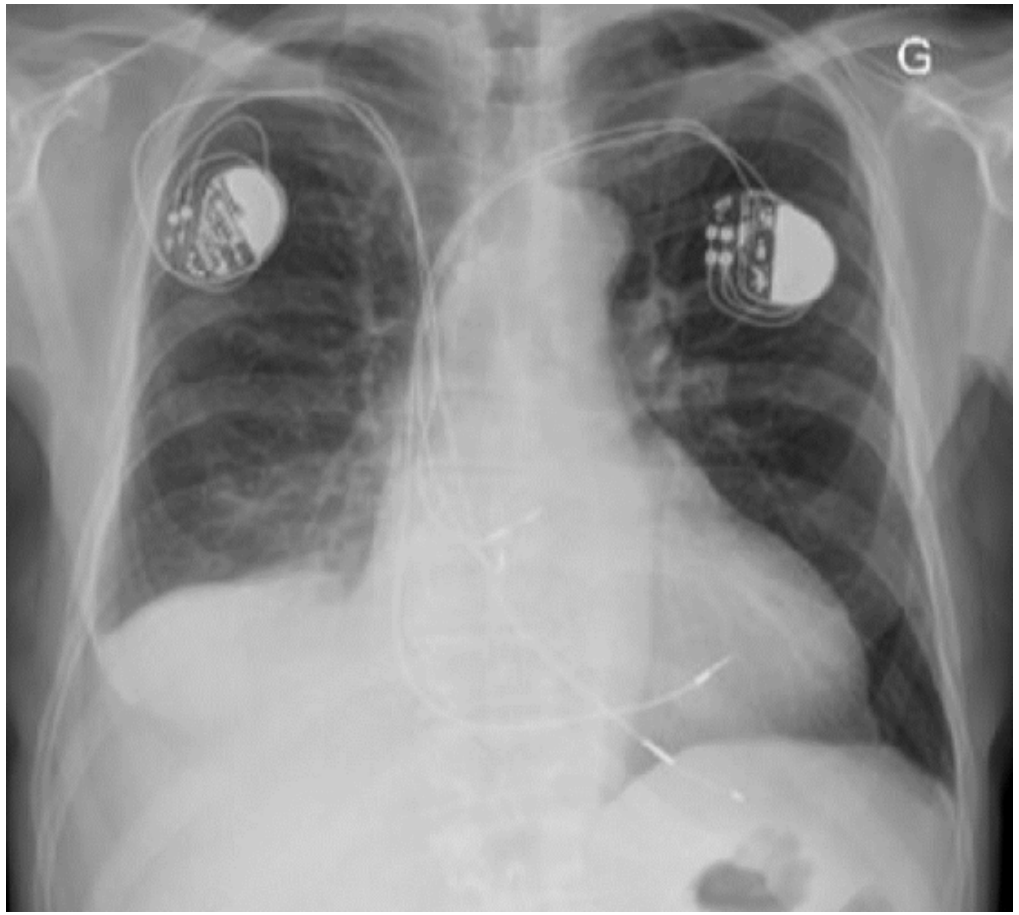


***Ne** réintervenir que lorsque c'est indispensable!*

Complications précoces

Lesquelles ? Peut-on les anticiper ?



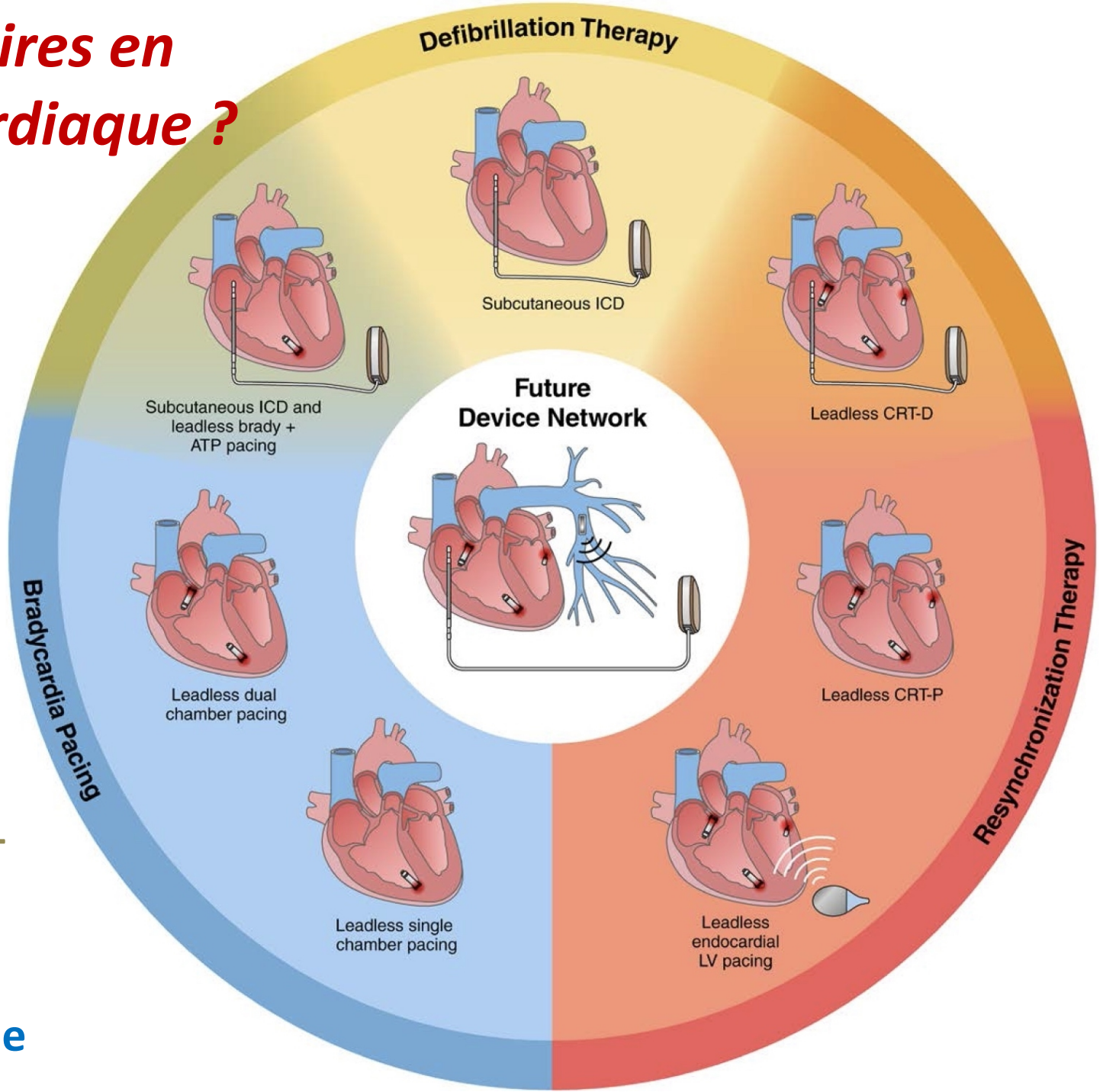


La fin des sondes endocavitaires en stimulation et défibrillation cardiaque ?

- ✓ **Oui++ à moyen terme → maillon faible en PM et DAI**
- ✓ **Etat de l'art actuel de stimulation sans sonde :**
  - **- Efficacité & sécurité en stimulation VVI**
  - **- 50% réduction risque / VVI classique**
  - **- Futures indications : PM DDD et CRT**
- ✓ **Développement+++ DAI sous-cutané : 40% des DAI VVI :**
  - **- Validation de son efficacité et sécurité :**

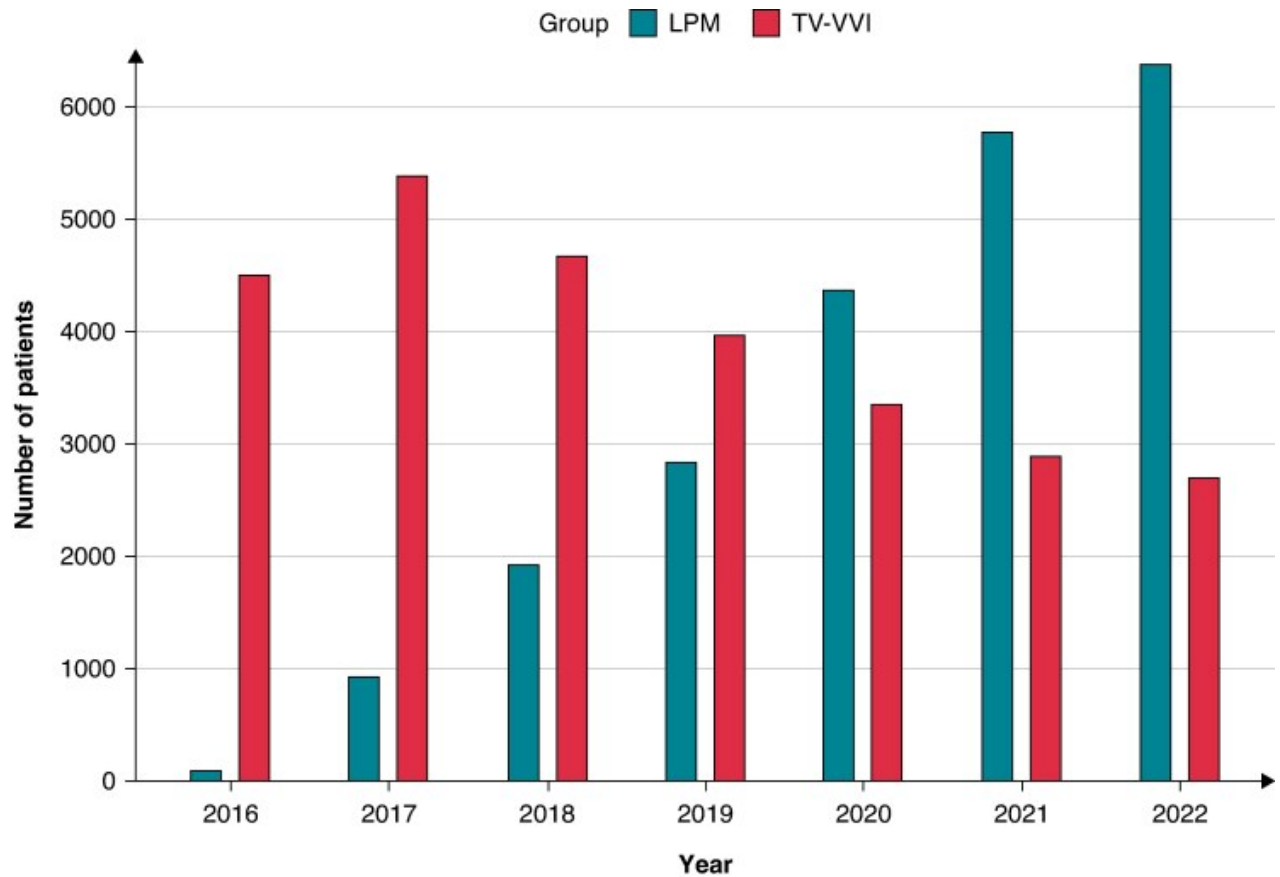
→ PRAETORIAN, UNTOUCHED, ATLAS, HONEST

- ✓ **Future : association PM sans sonde + DAI SC → extension des indications**
- ✓ **Recherche : Biofuel cell : PM biologique**



Comparison of readmission outcomes and complications between leadless and traditional transvenous pacemakers in older adults: a nationwide readmission analysis of 49852 admission events

Europace (2025) **27**, euaf268



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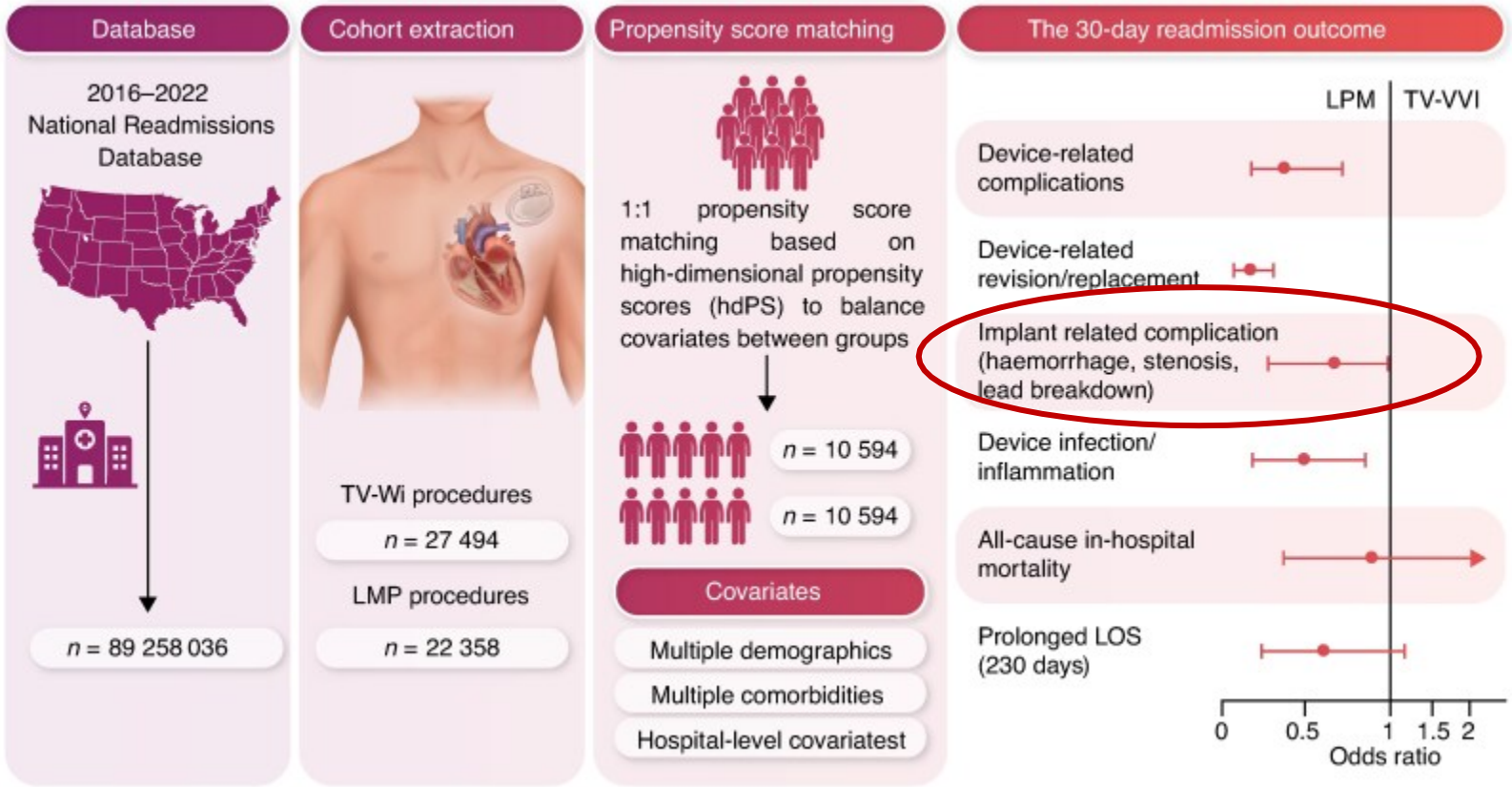
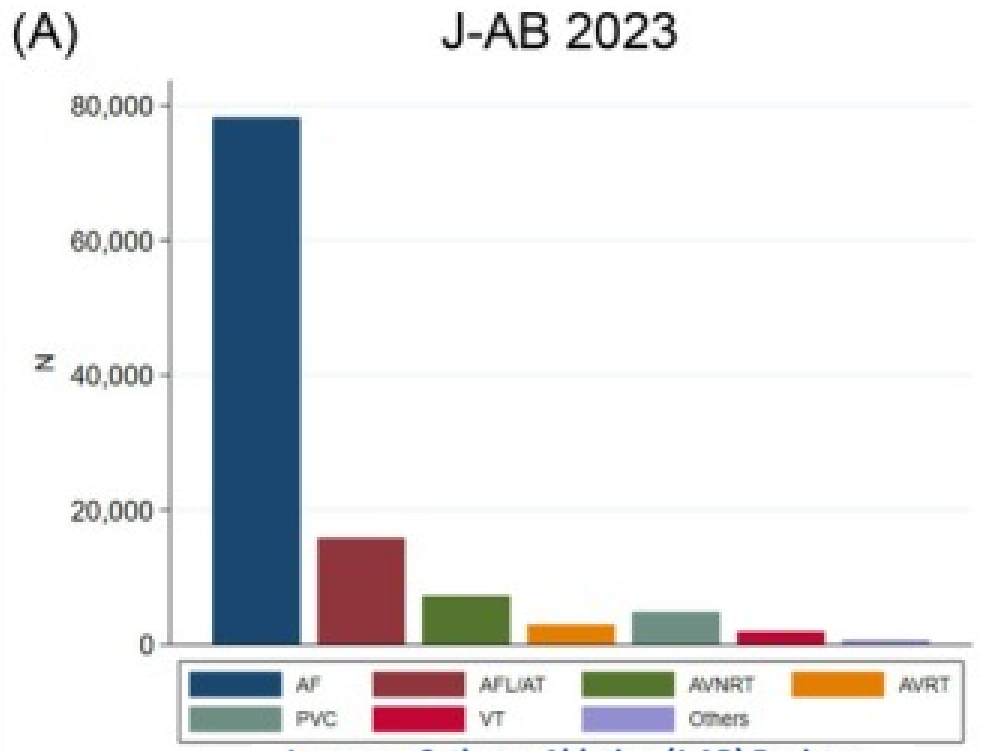
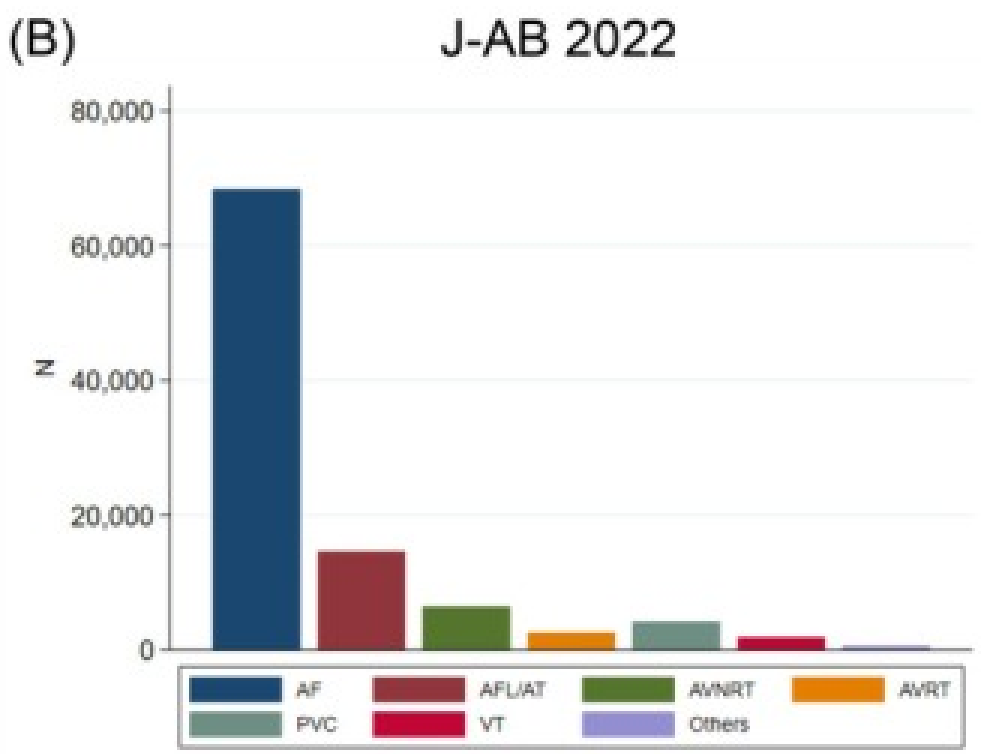


Principales complications de l'ablation

Quelles procédures les plus fréquentes en 2025 ?





Principales complications de l'ablation

Lesquelles ? Peut-on les anticiper ?

Table 16 **Procedure-related complications in catheter ablation and thoracoscopic ablation of AF**[771]

Complication severity	Complication type	Complication rate	
		Catheter ablation	Thoracoscopic ablation
Life-threatening complications	Periprocedural death	<0.1%	<0.1%
	Oesophageal perforation/fistula	<0.5%	N/A
	Periprocedural thromboembolic event	<1.0%	<1.5%
	Cardiac tamponade	≈1%	<1.0%
Severe complications	Pulmonary vein stenosis	<1.0%	N/A
	Persistent phrenic nerve palsy	<1.0%	N/A
	Vascular complications	2-4%	N/A
	Conversion to sternotomy	N/A	<1.7%
	Pneumothorax	N/A	<6.5%
Moderate or minor complications	Various	1 - 2%	1 - 3%
Complications of unknown significance	Asymptomatic cerebral embolism	5 - 15%	N/A

Complications liées à l’état clinique du patient

Lesquelles ? Peut-on les anticiper ?

Original Article

Am J Cardiovasc Dis 2024;14(2):128-135

Procedural and cardiovascular outcomes of geriatric vs non-geriatric patients undergoing permanent pacemaker implantation - a nationwide cohort analysis

Ayesha Shaik[1], Madhuwani Rojulpote[2], Nicholas Roma[3], Neel Patel[4], Yasar Sattar[5], Harshith Thyagaturu[5], Muchi Ditah Chobufo[5], Raahat Bansal[5], Anas Alharbi[5], Amro Taha[6], Sameer Raina[7], Karthik Gonuguntla[5]

Table 2. Complications of permanent pacemaker placement

	Complications		
Variable (PPM)	Elderly (≥70 years) (n = 328615)	Younger (<70 years) (n = 114845)	*P*-value
AKI	21 (%)	16.3 (%)	<0.01
Vascular complications	1.2 (%)	1.1 (%)	<0.01
Arteriovenous Fistula	0.1 (%)	0.1 (%)	<0.01
Pseudoaneurysm	0.1 (%)	0.1 (%)	0.1
Local site hematoma	0.8 (%)	0.5 (%)	<0.01
Hemoperitoneum	0.1 (%)	0.1 (%)	0.8
Hemopericardium	0.1 (%)	0.1 (%)	0.1
Hemothorax	0.2 (%)	0.3 (%)	<0.01
Cardiac complications	2.8 (%)	4.4 (%)	<0.01
Tamponade	0.5 (%)	0.4 (%)	<0.01
Lead dislodgement	1.1 (%)	1.4 (%)	<0.01

ESRD = End stage renal disease; AKI = acute kidney injury.

Factors affecting CIED implants in pediatric and congenital heart disease patients

Epidemiology of disease

Major indications for CIEDs in pediatric and congenital heart disease patients include:

- Postoperative heart block
- Congenital AV block
- Cardiomyopathic syndromes

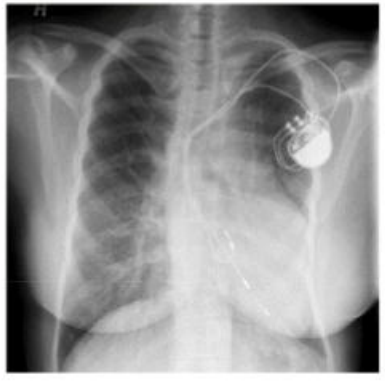
Cardiac resynchronization

- High burden of obligate ventricular pacing in patients with AV block
- Biventricular and left bundle area pacing strategies feasible in pediatric patients and show promise

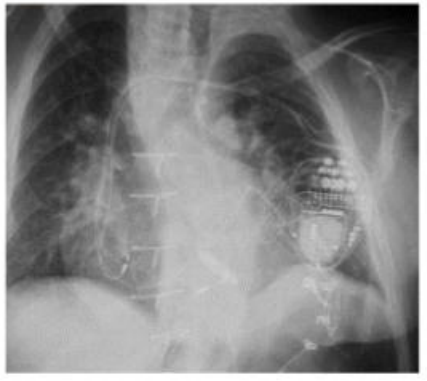
ICD therapy in children

- Complicated in pediatric patients by active lifestyle and high physiological heart rates
- Increasing interest in subcutaneous and retrosternal ICD systems

Growth, activity, lifespan



Stretching of transvenous lead due to somatic growth



Multiple revisions in child of epicardial and transvenous systems

In comparison to adult CIED populations, pediatric and congenital heart disease patients…

- Experience substantial linear growth over time, increasing risk of lead failure
- Are more active and have different physiological norms, with mismatch to device algorithms
- Have greater life expectancy, with increased demand for device durability and need for revision

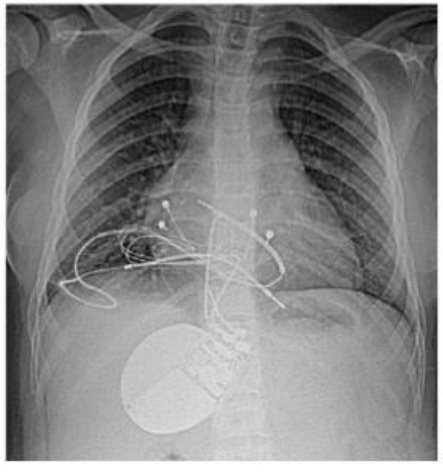
Anatomy and vascular access

Pediatric patients are generally smaller than adult patients:

- Mismatch of CIED components to cardiac and vascular structure
- Need for creative implantation techniques
- Increased use of epicardial techniques, especially in infancy

Congenital heart disease patients have limited intracardiac access:

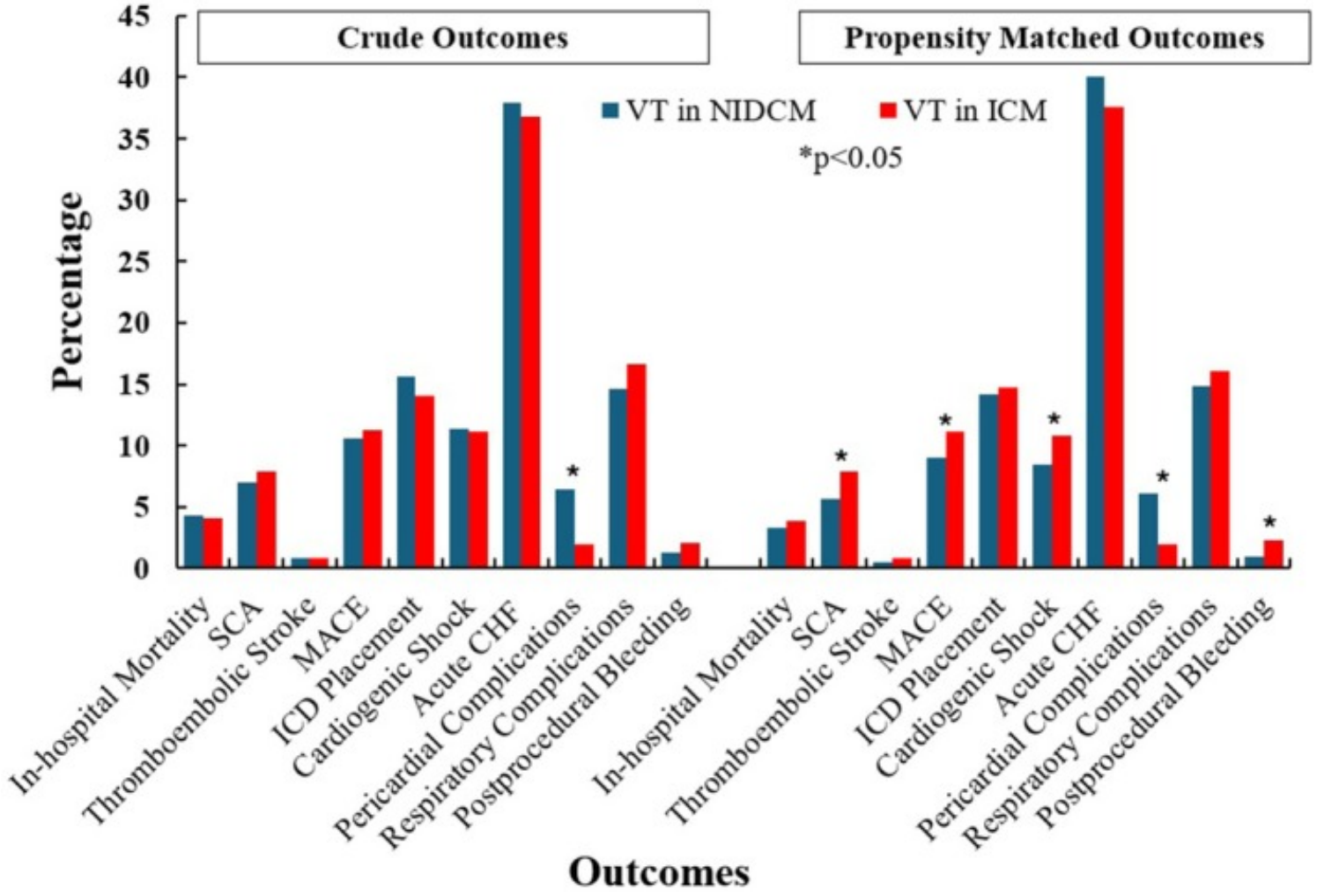
- Presence of intracardiac baffles and shunts



Epicardial ICD implant in infant

Principales complications de l'ablation

Quel profil clinique ? Peut-on les anticiper ?



Duhan S et al. ANE 2025 Nov; 30(6): e70126.

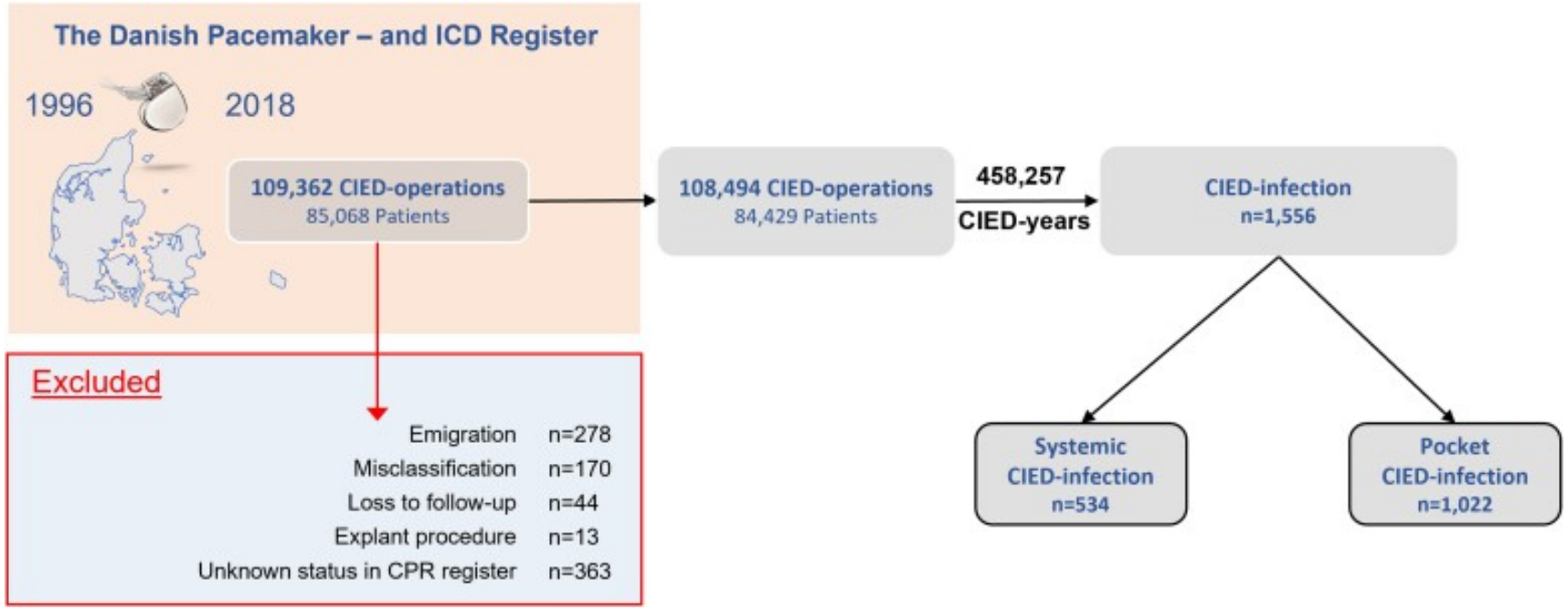
ESC European Society of Cardiology

European Heart Journal (2022) **43**, 4946–4956
https://doi.org/10.1093/eurheartj/ehac576

CLINICAL RESEARCH
Arrhythmias

Risk factors for cardiac implantable electronic device infections: a nationwide Danish study

Thomas Olsen [1]*, Ole Dan Jørgensen [2,6], Jens Cosedis Nielsen [3,6], Anna Margrethe Thøgersen [4], Berit Thornvig Philbert [5,6], Maria Hee Jung Park Frausing [3], Niels Christian Foldager Sandgaard [1], and Jens Brock Johansen [1,6]



Key Question

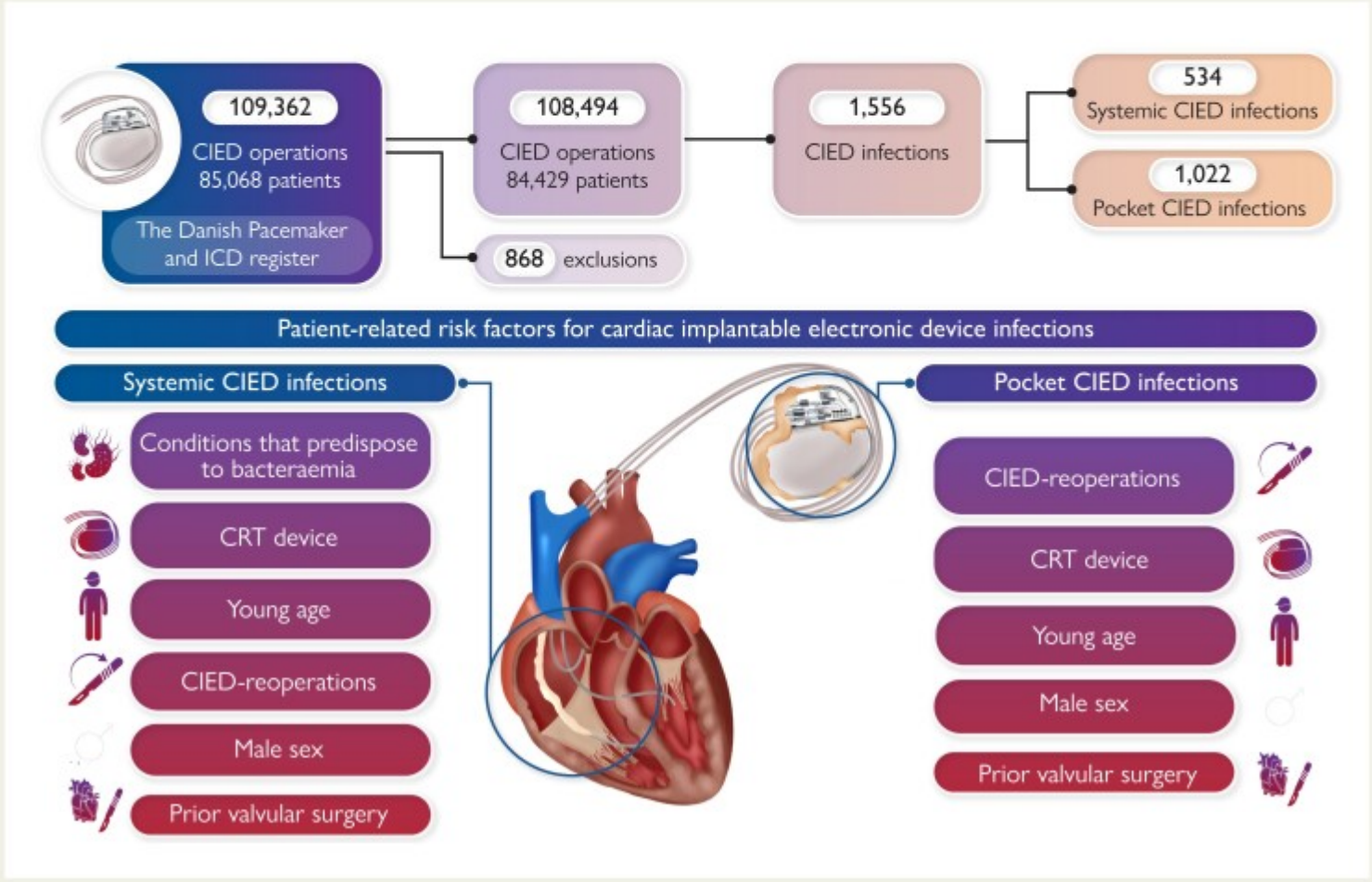
Cardiac implantable electronic device (CIED)-infection is a severe complication in the management of cardiac arrhythmias. Knowledge of long-term patient-related risk factors is scarce. The study aimed to identify lifelong patient-related risk factors for CIED-infections.

Key Finding

Risk factors differed according to the subtype of CIED-infection. Pocket CIED-infections were mainly associated with CIED-reoperations, young age and more complex type of CIED. Systemic CIED-infections were mainly associated with risk factors predisposing to bacteraemia.

Take Home Message

Specific comorbidities and surgical procedures are associated with higher risk of CIED-infections but with differences between pocket and systemic CIED-infection.



PACE
PACING AND CLINICAL ELECTROPHYSIOLOGY

ORIGINAL ARTICLE

Cardiovascular Outcomes in Patients With Cancer Undergoing Cardiac Implantable Electronic Device Implantation

Satyam Krishan, Siddharth Agarwal, Muhammad Bilal Munir, Olujimi Ajijola, Eric H. Yang, Anita Deswal, Estelle Torbey, Richard Cheng, Zain Ul Abideen Asad

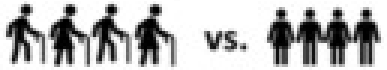
First published: 10 October 2025 | https://doi.org/10.1111/pace.70061

Conclusions

Patients with active cancer undergoing CIED implantation have an increased risk of in-hospital complications and readmissions as compared to those without cancer.

Study design

1.132 invasive EP procedures in aged and younger patients



Matching by type and timepoint of procedure

Mean age 82.7±2.5 years, range 80 to 95 years

Mean age 64.1±13.3 years

Assessment of periprocedural efficacy and safety

Results

- Performed procedures:
  - Atrial arrhythmia ablation including atrial fibrillation treatment (n=732, 64.7%)
  - Cavotricuspid isthmus ablation (n=278, 24.6%)
  - Ablation of ventricular arrhythmias (n=114, 10.1 %)
  - Left atrial appendage closure (n=24, 2.1%)
- Periprocedural adverse events (aged vs. younger patients):
  - Major complications 32 (5.7%) vs. 21 (3.5%) procedures, P=0.12
  - Minor complications 31 (5.1%) versus 17 (20%) procedures, P=0.039
  - Intrahospital deaths 6 (1.1%) vs. 1 (0.2%) procedure, P=0.12
- Presence of structural heart disease (Odds ratio 2.38, P=0.0067), procedure duration (Odds ratio 1.98, P=0.0483), contrast medium volume (Odds ratio 2.22, P=0.0262) and type of procedure (other than AF/AT and CTI) (Odds ratio 1.96, P=0.0499) had significant impact on the occurrence of complications and death in the aged group.

Conclusion

Invasive electrophysiological procedures in octogenarians and nonagenarians are feasible, but significantly more minor periprocedural complications and a trend toward more severe complications and intrahospital deaths were observed compared to younger patients. Individual risk-benefit assessment is warranted before invasive procedures in aged patients are performed.

J Cardiovasc Electrophysiol. 2025 May 26;36(8):1721–1732.

Journal of Cardiovascular Electrophysiology
THE OFFICIAL JOURNAL OF THE WORLD SOCIETY OF ARRHYTHMIAS
World Society of Arrhythmias
Editor-in-Chief Bradley P. Knight

ORIGINAL ARTICLE

Age, Frailty, and Outcomes After Atrial Fibrillation Ablation: A Nationwide Cohort Study

Olayiwola Bolaji, Olanrewaju Adabale, Yasemin Bahar, Blanche Echari, Vishnu Shenoy, Jaskomal Phagoora, Abdul Rasheed Bahar, M. Chadi Alraies, Hakeem Ayinde, John N. Catanzaro

First published: 06 August 2025 | https://doi.org/10.1111/jce.70032

Conclusions

Catheter ablation is increasingly performed in older patients. Advanced age and higher frailty are independently associated with adverse outcomes. These factors should be considered when evaluating patients for this procedure, and strategies to mitigate these risks should be explored.

Identification du patient à risque
Anticiper les éventuelles complications

- **Avant la procédure : apprêter la salle et consulter le dossier**
  - **Matériel de réanimation présent et fonctionnel dans le bloc ?**
    - Stimulateur, défibrillateur, aspiration…
    - Chariot d'urgence
    - Kit de drainage péricardique
  - **Absence de CI à la réalisation de la procédure ?**
    - Biologie (coagulation, CRP…), allergie, test de grossesse
    - Bonne observance des traitements, bonne identité
    - Examens préalables (ETO, TDM…)
- **Risques liés au profil clinique : bien cibler le patient « fragile »**
  - **Dans la mesure du possible procédure en situation HMD stable**
  - **Prévenir le risque vasculaire → ponction écho guidée+++**
  - **Prévenir le risque infectieux → ATB prophylactique ± enveloppe ATB**
- **Risques liés à l'environnement : adaptée à la procédure !**

Pt à risque et prévention des complications

Take Home Messages

- **Il n'y a pas de procédures simples en rythmologie interventionnelle+++**
- **Taux de complications stables malgré ↑ nb procédures car pts fragiles++**
- **Hématomes loges et déplacements sondes en PM/DAI** → avènement de PM et DAI sans sondes
- Tamponnades et complications vasculaires lors ablations → ponctions écho guidées

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