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Permanent Cardiac Pacing in Togo: Current Status, Clinical Outcomes and Perspectives in a Resource-Limited Setting

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Abstract

Background: Permanent cardiac pacing is the standard treatment for severe symptomatic bradyarrhythmias and conduction disorders. In low-income countries, access to pacemaker therapy remains limited, and published data are scarce. **Objective:** To describe the evolution of permanent pacemaker implantation in Togo, analyse patient characteristics, indications, outcomes and complications, and discuss challenges related to a resource-limited setting. **Methods:** A retrospective descriptive study was conducted in the main cardiology centres in Togo from January 2010 to December 2025. All patients who underwent permanent pacemaker implantation were included. Sociodemographic, clinical, electrocardiographic, technical and outcome data were analysed. **Results:** A total of 291 patients were included. The mean age was 70.9 ± 12.5 years, with a male predominance. Dyspnoea (58.5%) and syncope (31.3%) were the most common presenting symptoms. High-degree atrioventricular block was the leading indication for implantation. The mean delay between diagnosis and implantation was 38.3 days. Dual-chamber pacemakers accounted for 49% of all implants, with a marked increase since 2022 (81.4%). The overall complication rate was low, with each major complication occurring in less than 3% of cases. **Conclusion:** Permanent cardiac pacing is feasible and safe in Togo. Despite persistent delays, recent improvements reflect strengthening local expertise. Establishing a national registry and improving financial access to devices are key priorities to optimise care.

Keywords

Permanent Pacemaker, Bradyarrhythmia, Atrioventricular Block, Togo, Sub-Saharan Africa

1. Introduction

Permanent cardiac pacing is the reference treatment for severe symptomatic bradyarrhythmias, particularly high-degree atrioventricular block and selected sinus node dysfunctions. Pacemaker implantation significantly improves survival, functional capacity and quality of life [1] [2].

In high-income countries, pacemaker therapy is widely available and guided by well-established international recommendations, including those of the European Society of Cardiology and the European Heart Rhythm Association [1] [2]. In contrast, access remains limited in many low-resource countries because of financial, technical and organisational constraints [3] [4].

In sub-Saharan Africa, published data on permanent cardiac pacing remain limited and heterogeneous [5] [6]. Several studies have reported prolonged treatment delays and increased mortality among patients who do not receive timely implantation [7]-[9]. In Togo, pacemaker implantation has gradually developed over the past decade, but only one study was published in 2011 [10].

This study aims to report a 15-year experience of permanent cardiac pacing in Togo, focusing on patient characteristics, indications, procedural outcomes and context-specific challenges.

2. Methods

2.1. Study Design and Setting

This was a retrospective, observational and descriptive study conducted in the main Togolese centres performing pacemaker implantation: Campus University Hospital, Dogta-Lafiè Hospital, Wossinu and Gbogbo Polyclinic, Bonne Espérance Clinic and Le Cœur Clinic.

2.2. Study Population

All patients who underwent permanent pacemaker implantation (single- or dual-chamber) between 1st January 2010 and 30th November 2025 were included. Patients with incomplete records for essential variables were excluded from specific analyses. Patients implanted outside Togo were not included.

2.3. Data Collection

Data were collected from medical records, operative reports and hospital databases. Variables included age, sex, presenting symptoms, electrocardiographic indication, type of pacemaker (new or reuse), treatment delay, technical implanta-

tion data and peri- and post-operative complications.

The reconditioned pacemakers used in this study were obtained from two main sources: devices recovered outside Togo from deceased patients, within the framework of ethical and solidarity-based retrieval programs; and pacemakers retrieved locally in Togo after the death of implanted patients, with prior consent from the families. In all cases, device retrieval was conducted in accordance with ethical principles, with full traceability of the origin, model, and serial number. Devices showing visible signs of deterioration, corrosion, or malfunction were systematically excluded.

Following retrieval, pacemakers underwent careful mechanical cleaning to remove any biological or particulate residues. They were then subjected to a standardized sterilization protocol based on ethylene oxide sterilization (or another locally validated method), which is recognized for its effectiveness on heat-sensitive implantable medical devices. Each sterilization cycle was monitored using chemical and biological indicators to ensure the effectiveness of the process and the absence of residual contamination.

Before any reimplantation, a rigorous quality control process was performed. This included verification of the integrity of the device casing and connectors; assessment of battery status, with a minimum residual charge requirement sufficient to ensure an acceptable predicted device longevity; comprehensive testing of electrical parameters (output amplitude, sensitivity, impedance); and reprogramming of the device according to the patient's clinical needs. Pacemakers that did not meet predefined safety, performance, or estimated longevity criteria were excluded from the reconditioning process.

Prior to implantation, all patients (or their legal representatives) were informed of the reconditioned nature of the device, the available therapeutic alternatives, and the potential benefits and risks. Written informed consent was systematically obtained before the procedure.

2.4. Statistical Analysis

Data were analysed using R software (version 4.3) or Stata (version 17). Quantitative variables are presented as mean ± standard deviation, and qualitative variables as numbers and percentages.

2.5. Ethical Considerations

The study was approved by the Ethics Committee of the Faculty of Health Sciences, University of Lomé. All data were anonymised and handled confidentially.

3. Results

3.1. Sociodemographic Characteristics

A total of 291 patients were included. Mean age was 70.9 ± 12.5 years (range: 44 - 104 years). There were 201 men and 90 women, yielding a male-to-female ratio of

2.23. Pacemaker implantation activity increased steadily over the study period (Figure 1).

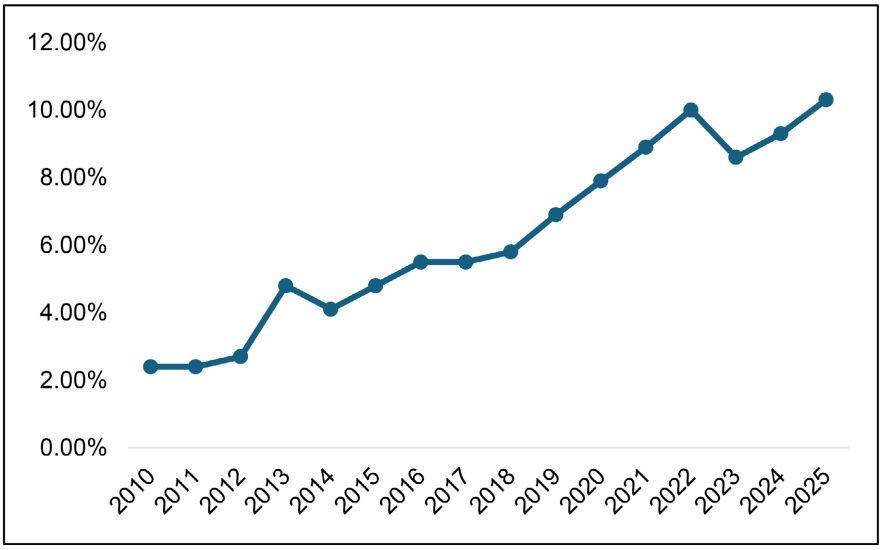


Figure 1. Distribution of pacemaker implantations according to year.

3.2. Clinical Presentation

The most frequent symptoms at presentation were dyspnoea (58.5%), syncope (31.3%) and presyncope (25.1%) (Table 1). Several patients presented with multiple symptoms.

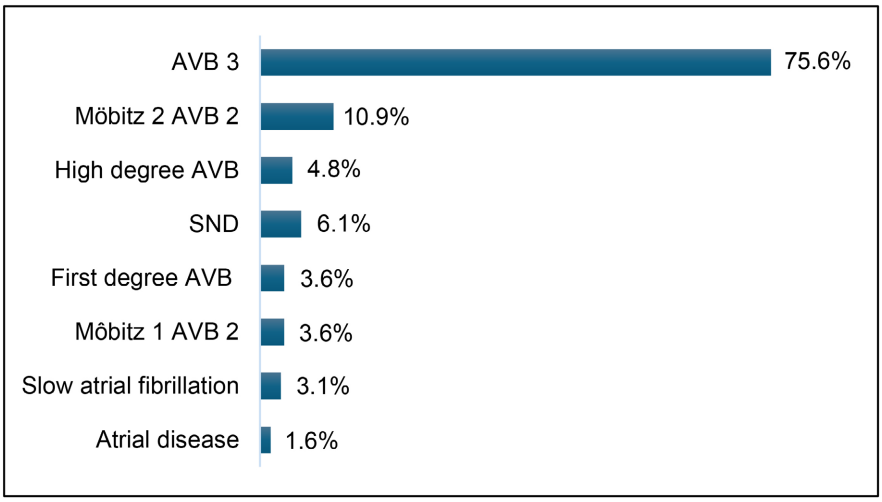
Table 1. Distribution of patients according to presenting symptoms.

Symptom	Percentage
Dyspnoea	58.5
Syncope	31.3
Presyncope	25.1
Dizziness	17.2
Physical asthenia	10.9
Palpitations	3.1

3.3. Indications for Pacemaker Implantation

Indications were dominated by severe conduction disorders. High-degree atrioventricular block accounted for the majority of cases, including complete atrioventricular block in 75.6%. The distribution of indications is shown in Figure 2.

The mean delay between diagnosis and implantation was 38.3 ± 15 days (range: 2 - 398 days). The largest proportion of patients (37.5%) were implanted between 31 and 180 days.



AVB: Atrioventricular Block; SND: sinus node dysfunction.

Figure 2. Distribution of indications for pacemaker implantation.

3.4. Technical Characteristics

Overall, dual-chamber pacemakers represented 49% of implants. Since 2022, their use increased markedly to 81.4%. The subclavian venous approach was used in 57% of procedures, while the cephalic approach was used in 43%. Septal positioning of the right ventricular lead was predominant (63%).

Peri-operative incidents included bleeding (5%), syncope (3%), lead displacement (1%) and atrial lead implantation difficulty (0.6%).

Primary implantation accounted for 93.7% of procedures, and generator replacement for 6.3%. Pacemakers were new in 84.4% of cases and reconditioned in 15.6%. The most commonly used manufacturers were Medtronic (59%) and Abbott/St Jude Medical (30%) (**Figure 3**). The devices were purchased by patients themselves or their families in 96.2%. Only 3.7% of patients benefited from private health insurance coverage.

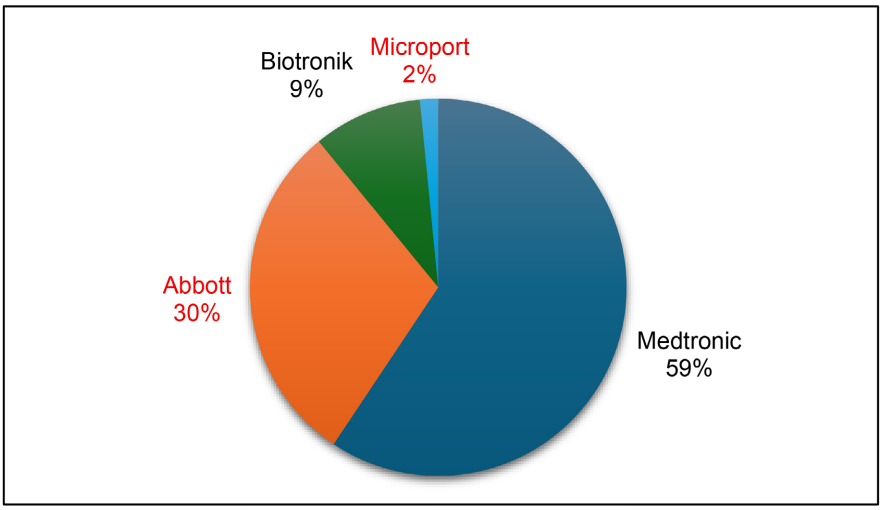


Figure 3. Distribution according to the manufacturer of the implanted device.

3.5. Evolution and Complications

The mean follow-up duration was 7 yeras, with a minimum follow-up of 1 month and a maximum follow-up of 15 years. The overall complication rate was low. Pocket haematoma, lead displacement and pocket infection each occurred in less than 3% of cases. Other complications were rare (Table 2).

Table 2. Pacemaker implantation characteristics.

	Percentage
Globale implantation type	
• Dual-chamber pacing (DDD)	49
• Single-chamber pacing (VVI)	47.7
• Single-chamber pacing (VDD)	4.3
Since 2022 implantation type	
• Dual-chamber pacing since (DDD)	81.4
• Single-chamber pacing since (VVI)	15.9
• Single-chamber pacing since (VDD)	2.3
Venous access	
• Subclavian venous access	57
• Cephalic venous access	43
Leads position	
• Right atrial lead: right atrial appendage	100
• Right ventricular lead: septal position	63
• Right ventricular lead: apical position	37
Pacemaker position	
• Right pre-pectoral pocket	42.2
• Left pre-pectoral pocket	57.8
Post-operative complications	
• Lead displacement	1.37
• Pocket haematoma	2.06
• Pocket infection	1.37
• Death	0.34
• Pneumothorax	0.34
• Upper limb thrombosis	0.68

4. Discussion

This study represents one of the largest reported series of permanent cardiac pacing in Togo. Patients were predominantly elderly, which is consistent with African and international studies reporting mean ages between 65 and 75 years [9] [11]. This reflects the degenerative nature of conduction disorders.

Dyspnoea and syncope were the most frequent presenting symptoms, consistent with haemodynamic compromise related to severe bradyarrhythmias [2] [9] [12]. Implantation indications were mainly high-degree atrioventricular block, as reported in most sub-Saharan African series [7] [9] [11] [13] [14], in contrast to high-income countries, where sinus node dysfunction is more frequent [1] [15]. The preferential septal positioning of the ventricular lead observed in our series also aligns with a modern trend aimed at limiting the deleterious effects of prolonged apical pacing [16] [17].

Treatment delays remained substantial, reflecting limited access to devices and financing. Such delays are associated with increased morbidity and mortality [10] [11]. However, the increasing use of dual-chamber pacemakers since 2022 indicates progressive improvement in local practice and alignment with international guidelines [1] [2]. This increase in dual-chamber pacemaker implantation can be explained by improved device availability and, most importantly, the training of medical staff between 2019 and 2021.

The low complication rate observed in this study is comparable to international data and confirms the safety of pacemaker implantation in this setting. The use of reconditioned pacemakers contributed to improved access, with acceptable safety outcomes, as previously reported [9] [18]-[20].

4.1. Study Limitations

The retrospective design may have resulted in missing data and heterogeneous follow-up. The absence of a national pacemaker registry limited long-term outcome assessment.

4.2. Perspectives

The establishment of a national registry, reinforcement of electrophysiology training and improved financial coverage are essential to further expand access to permanent cardiac pacing in Togo.

5. Conclusion

Permanent cardiac pacing is steadily developing in Togo. Strengthening local capacity, reducing treatment delays, integrating pacemaker therapy into universal health insurance and implementing a national registry are priorities to improve patient outcomes in a resource-limited setting.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Glikson, M., Nielsen, J.C., Kronborg, M.B., Michowitz, Y., Auricchio, A., Barbash, I.M., *et al.* (2021) 2021 ESC Guidelines on Cardiac Pacing and Cardiac Resynchronization Therapy. *European Heart Journal*, **42**, 3427-3520. https://doi.org/10.1093/eurheartj/ehab364

[2] Kusumoto, F.M., Schoenfeld, M.H., Barrett, C., Edgerton, J.R., Ellenbogen, K.A., Gold, M.R., *et al.* (2019) 2018 ACC/AHA/HRS Guideline on the Evaluation and Management of Patients with Bradycardia and Cardiac Conduction Delay: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *Circulation*, **140**, e382-e482. https://doi.org/10.1161/cir.0000000000000628

[3] Bonny, A., Ngantcha, M., Yuyun, M.F., Karaye, K.M., Scholtz, W., Suliman, A., *et al.* (2020) Cardiac Arrhythmia Services in Africa from 2011 to 2018: The Second Report from the Pan African Society of Cardiology Working Group on Cardiac Arrhythmias and Pacing. *EP Europace*, **22**, 420-433. https://doi.org/10.1093/europace/euz354

[4] Mkoko, P., Bahiru, E., Ajijola, O.A., Bonny, A. and Chin, A. (2020) Cardiac Arrhythmias in Low- and Middle-Income Countries. *Cardiovascular Diagnosis and Therapy*, **10**, 350-360. https://doi.org/10.21037/cdt.2019.09.21

[5] Kane, A., Houndolo, R., Adoubi, I., Camara, S., Pessinaba, S. and Sy, K. (2016) Challenges of Permanent Cardiac Pacing in Sub-Saharan Africa: The STIMAFRIQUE Multicentre Study. *Cardiologie Tropicale*, **143**, 21.

[6] Adoubi, K.A., Coulibaly, I., Ndjessan, J.J., Gnaba, A., Tano, M., Tro, G., *et al.* (2022) Caractéristiques et évolution des complications de la stimulation cardiaque dans un centre de cardiologie de l'Afrique de Subsaharienne. *Annales de Cardiologie et d'Angéiologie*, **71**, 21-26. https://doi.org/10.1016/j.ancard.2021.01.005

[7] Kane, A., Sarr, S.A., Ndobo, J.V.D., Tabane, A., Babaka, K., Aw, F., *et al.* (2019) Cardiac Pacing Challenge in Sub-Saharan Africa Environnement: Experience of the Cardiology Department of Teaching Hospital Aristide Le Dantec in Dakar. *BMC Cardiovascular Disorders*, **19**, Article No. 197. https://doi.org/10.1186/s12872-019-1176-2

[8] Camara, Y., Ba, H.O., Sangaré, I., Thiam, C.A., Sonfo, B., Sidibé, N., *et al.* (2021) Permanent Cardiac Pacing at Sidi Bocar Sall University Hospital, Kati: Patient Profile and Indications. *Health Sciences and Disease*, **22**, 14-17.

[9] Dia, K., Sarr, S.A., Mboup, W.N., Diouf, Y., Benghazi, N., Mbaye, A., *et al.* (2024) Cardiac Pacing: Indications, Modalities, Complications, and Challenges (Results of a Multicenter Cross-Sectional Study in Four Hospitals in Dakar, Senegal). *The Pan African Medical Journal*, **49**, Article 14. https://doi.org/10.11604/pamj.2024.49.14.43515

[10] Yayehd, K., Ganou, K., Tchamdja, T., Tété, Y., N'cho Mottoh, M.P., Pessinaba, S., *et al.* (2011) Management of High-Degree Atrioventricular Block in Lomé, Togo. *Médecine Tropicale*, **71**, 637-638.

[11] Jouven, X., Diop, B.I., Narayanan, K., Adoubi, A., Ba, S.A., Balde, D., *et al.* (2019) Cardiac Pacing in Sub-Saharan Africa. *Journal of the American College of Cardiology*, **74**, 2652-2660. https://doi.org/10.1016/j.jacc.2019.09.034

[12] Camara, S., Cheikh, M., Ba, H., Boye, K.I., Barry, F., Eba, A., *et al.* (2019) Clinical Profile and Follow-Up of Patients with Permanent Pacemakers in Mauritania. *Revue Tunisienne de Cardiologie*, **15**, 170-175.

[13] Mbaye, A., Fall, M., Ngaïdé, A.A.K.I., N'Diaye, M. and Cissé, A.F. (2016) Cardiac

Pacing Practice: A Report of 215 Pacemaker Implantations at the General Hospital of Grand Yoff, Dakar, Senegal. *Cardiologie Tropicale*, **143**, 10.

[14] Millogo, G.R.C., Seghda, A., Ilboudo, M., Konaté, L., Bassolet, B., Kologo, J.K., *et al.* (2017) Bilan de cinq ans de stimulation cardiaque dans deux structures hospitalières publiques du Burkina Faso: Expérience d'une collaboration avec deux centres hospitaliers d'Auvergne. *Annales de Cardiologie et d'Angéiologie*, **66**, 255-259. https://doi.org/10.1016/j.ancard.2017.09.018

[15] Cano Pérez, Ó., Pombo Jiménez, M., Fidalgo Andrés, M.L., Lorente Carreño, D. and Coma Samartín, R. (2017) Spanish Pacemaker Registry. 14th Official Report of the Spanish Society of Cardiology Working Group on Cardiac Pacing (2016). *Revista Española de Cardiología* (*English Edition*), **70**, 1083-1097. https://doi.org/10.1016/j.rec.2017.08.017

[16] Khurshid, S., Epstein, A.E., Verdino, R.J., Lin, D., Goldberg, L.R., Marchlinski, F.E., *et al.* (2014) Incidence and Predictors of Right Ventricular Pacing-Induced Cardiomyopathy. *Heart Rhythm*, **11**, 1619-1625. https://doi.org/10.1016/j.hrthm.2014.05.040

[17] Zhang, X., Chen, H., Siu, C., Yiu, K., Chan, W., Lee, K.L., *et al.* (2007) New-Onset Heart Failure after Permanent Right Ventricular Apical Pacing in Patients with Acquired High-Grade Atrioventricular Block and Normal Left Ventricular Function. *Journal of Cardiovascular Electrophysiology*, **19**, 136-141. https://doi.org/10.1111/j.1540-8167.2007.01014.x

[18] Tandon, K., Tate, T. and Kirkpatrick, J.N. (2017) Pacemaker Reuse in Low-Income/Middle-Income Countries: Moral Duty or Dangerous Precedent? *Heart*, **103**, 1846-1847. https://doi.org/10.1136/heartjnl-2017-311572

[19] VanArtsdalen, J., Goold, S.D., Kirkpatrick, J.N., Goldman, E., Eagle, K. and Crawford, T. (2012) Pacemaker Reuse for Patients in Resource Poor Countries: Is Something Always Better than Nothing? *Progress in Cardiovascular Diseases*, **55**, 300-306. https://doi.org/10.1016/j.pcad.2012.10.002

[20] Kirkpatrick, J.N., Papini, C., Baman, T.S., Khota, K., Eagle, K.A., Verdino, R.J., *et al.* (2010) Reuse of Pacemakers and Defibrillators in Developing Countries: Logistical, Legal, and Ethical Barriers and Solutions. *Heart Rhythm*, **7**, 1623-1627. https://doi.org/10.1016/j.hrthm.2010.04.027