

Statistics on the use of cardiac electronic devices and interventional electrophysiological procedures in Africa from 2011 to 2016: report of the Pan African Society of Cardiology (PASCAR) Cardiac Arrhythmias and Pacing Task Forces

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Aims	To provide comprehensive information on the access and use of cardiac implantable electronic devices (CIED) and catheter ablation procedures in Africa.
Methods and results	The Pan-African Society of Cardiology (PASCAR) collected data on invasive management of cardiac arrhythmias from 2011 to 2016 from 31 African countries. A specific template was completed by physicians, and additional information obtained from industry. Information on health care systems, demographics, economics, procedure rates, and specific training programs was collected. Considerable heterogeneity in the access to arrhythmia care was observed across Africa. Eight of the 31 countries surveyed (26%) did not perform pacemaker implantations. The median pacemaker implantation rate was 2.66 per million population per country (range: 0.14–233 per million population). Implantable cardioverter-defibrillator and cardiac resynchronization therapy were performed in 12/31 (39%) and 15/31 (48%) countries respectively, mostly by visiting teams. Electrophysiological studies, including complex catheter ablations were performed in all countries from Maghreb, but only one sub-Saharan African country

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(South Africa). Marked variation in cost (up to 1000-fold) was observed across countries with an inverse correlation between implant rates and the procedure fees standardized to the gross domestic product per capita. Lack of economic resources and facilities, high cost of procedures, deficiency of trained physicians, and non-existent fellowship programs were the main drivers of under-utilization of interventional cardiac arrhythmia care. Conclusion There is limited access to CIED and ablation procedures in Africa. A quarter of countries did not have pacemaker implantation services, and catheter ablations were only available in one country in sub-Saharan Africa. **Keywords** Pacemaker • Cardiac resynchronization therapy • Implantable cardioverter-defibrillator • Cardiac electrophysiology • Africa • Interventional electrophysiological procedures • Catheter ablation

What's new?

- This survey highlights the appalling lack of infrastructure and human resource available for the management of cardiac arrhythmias in sub-Saharan Africa.
- There is no consistent access to invasive therapies (pacing/ catheter ablation) in 30% of the African countries.
- The pacemaker implantation rate of pacemakers is 200-fold lower than in Western Europe.
- The very low density of trained physicians, lack of economic resources and facilities, high-procedural costs in the setting of pay-out-of-pocket health care, and a shortage of fellowship programmes remain the main drivers for under-utilization of interventional arrhythmia therapies in Africa.
- The data can serve as a roadmap for future strategic initiatives to develop cardiac arrhythmia services in the African countries including more ambitious public health expenditure, more efficient training of personnel, and improved infrastructure development.

Introduction

Cardiac arrhythmias are under diagnosed and pacing and electrophysiological (EP) procedures remain poorly developed in most African countries.¹ While there is some information on pacemaker implantation, implantable cardioverter-defibrillator (ICD), and cardiac electrophysiology services in a few sub-Saharan African (SSA) countries,^{2–11} there are no studies addressing the question of access to cardiac implantable electronic devices (CIED) and ablation techniques in Africa. The Cardiac Arrhythmia and Pacing Task Forces of the Pan-African Society of Cardiology (PASCAR) sought to carry out a comprehensive assessment of device implantations and EP procedures in African countries and to determine the major influencing factors, including demographic, social, economic, and health governance aspects.

Methodology

The PASCAR Cardiac Arrhythmias and Pacing Task Forces collected comparative statistics from 31 countries representing all regions of Africa, with the aim of providing comprehensive information on EP activity, and EP staff, in relation to the demographic and economic

aspects of the African continent. A questionnaire on activities of centres in the various countries affiliated to the PASCAR was sent to cardiologists and cardiac surgeons on the PASCAR mailing list, EP physicians, and heads of cardiology departments; these data were cross-checked by device manufacturers (Biotronik, Boston Scientific, Medtronic, Saint Jude Medical-Abott, and Liva Nova) and local distributors who were provided information of CIED sales. For countries outside the PASCAR network, we requested official governmental information on the existence (or otherwise) of CIED and EP services (Sao Tome and Principle for instance). Finally, reports on demographic, social, economic and financial, and vital statistics came from World Bank, World Health Organization (WHO), and International Monetary Fund database.^{12,13}

The questionnaire sent to local investigators focused on the annual activity during the study period regarding (i) patient's demographics, estimates of the total number of medical staff, EP physicians, affiliated centres by country, curriculum, and specific training programs; (ii) pacemakers, cardiac resynchronization therapy (CRT), ICD implantations; (iii) the availability of isoprenaline and temporary pacing as a bridge to permanent pacemaker insertion; (iv) EP studies and catheter ablations procedures; and (v) details on local costs of invasive procedures. We attempted to establish the association between the cost of procedures, the gross domestic product (GDP) per capita, and the implantation rates.

This is a descriptive study. Statistical analysis was made using Microsoft Excel. Mean (standard deviation), median (interguartile range), and ranges were used as appropriate for the different variables. The rates were standardized by the population in the corresponding country, and implantation rates were presented per million of population.

Results

Demographics, societal, financial and economic, and vital statistics aspects

Distribution of the population, vital statistics, and GDP of the 31 countries surveyed are presented in Table 1.

Regarding the financial profile of the different African countries, it is worth stressing that in 2014, GDP ranged between \$0.3 billion in Sao Tome and Principe to \$568.5 billion in Nigeria, while GDP per capita ranged between \$377.1 in Central African Republic to \$19 002.6 in Equatorial Guinea (Table 1). This clearly

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Central African Republic 4 515 392 0.3 51 15 1 702 898.9 377.1 4.2 16 188 31	Niger	19 148 219	3.8	61	6	8 245 312.1	430.6	5.8	24	187	28
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Figure I Percentage of THE funded by households. In more than half of African countries, households funded overwhelming health care expenditures. THE, total health expenditures.

Source: WHO database 2014.

demonstrates the marked heterogeneity in the financial profiles of the countries.

Health care systems and expenditures

Many countries face large, unmet health needs, and pressures on health systems are expected to increase. Making further progress towards universal health coverage (UHC) is critical to promote equity, human rights, and patient safety in health care and subsequently improve the human development index that is critical for almost all African countries (*Table 1*). The organization of health care across the PASCAR countries is heterogeneous with few providing universal health care services to the entire population. In most countries, health care services are primarily supported by household incomes (out-of-pocket payment expenditures) rather than by public or commercial health insurance companies.¹³ In 2014, between 40% and 60% of total health expenditures (THE) were funded by households in half of SSA countries¹³ (*Figure 1*).

Health care expenditure has been escalating rapidly in some countries such as Algeria, Botswana, Egypt, Equatorial Guinea, Mauritius, Morocco, Namibia, South Africa, Swaziland, and Tunisia (*Figure 2*). In contrast, for the same period from 1995 to 2014, this progression was slow in many other countries of SSA (*Figure 2*). Most countries committed to increase public health spending to at least 15% of the government's budget in line with the 2001 Abuja Declaration.¹³ However, between 2002 and 2014, government health expenditures diminished in 50% of African countries (*Figure 3*). As shown in *Table 1*, the mean health expenditure in the countries surveyed as percentage of the GDP was 5.5%. It was lowest in Gabon (3.4%) and highest in South Africa (8.8%). The health expenditure per capita was lowest in Central African Republic (16 USD) and Niger (24 USD), and highest in South Africa (570 USD) and Equatorial Guinea (663 USD). Hence, there was more than 40-fold difference between the lowest and highest health care expenditures per capita in the survey.

Pacemakers

General information

We collected data from 31 PASCAR countries (*Figure 4*). The information on affiliation of EP physicians (teaching or non-teaching hospitals and private clinics), the availability of isoprenaline, the use of temporary pacing as the bridge to permanent pacing, and EP studies are reported in *Table 2. Table 3* lists the number of pacing centres and implanting physicians of 23 countries with consistent pacemaker activity. Central African Republic, Equatorial Guinea, Niger, and Saô Tomé and Principe did not have local expertise (13%), whereas countries like Chad, Congo Republic, Guinea Conakry, and Togo were dependent on visiting missions to implant pacemakers (*Figure 4*). A national registry was not available in any country. Population data (World Bank; 2014 database) estimate a total of 835 058 745 people living in the 23 countries where pacemakers were implanted and 62 459 264 people in the 8 countries without any pacemaker service.

Pacemaker facilities and implantation rate

Our survey demonstrates that in 2013, a total number of 16 271 devices were implanted in 21 countries, representing an implantation rate of 18 devices per million population; whereas in 2014, a total number of 11 600 devices were implanted in 17 countries, representing an implantation rate of 19 devices per million population. The number of pacing centres per million population was <1.0 in 2013 and remained unchanged in 2014. Mauritius had the highest density of facilities (6.3 centres per million population) in contrast to Uganda and Ethiopia (0.03 per million population, *Figure 5*). Overall, countries from North Africa had a higher pacemaker implantation rate compared with SSA countries (*Table 4*). In 2013, the median



Figure 2 Evolution of the THE per capita from 1995 to 2014 among African countries. Except Guinea Bissau and countries with high political instability such as Central African Republic and Republic Democratic of Congo, countries have increase their THE per capita between 1995 and 2014. Source: World Bank Group 2014.



Figure 3 Government budget allocated to health between 2002 and 2014. There is a high disparity among countries regarding the budget allocated to health. Source: World Bank Group 2014.



implantation rate in Africa was 2.66 per million population which was 200-fold lower compared with Europe with 552 per million population (*Figure 6*). In 2014 the lowest implantation rate was in Nigeria with 0.14 implants per million population. Longer term data spanning a minimum of 3 years are available from 11 countries (*Figure 7*), and the overall trends were in favour of an increase in the number of pacemakers implanted (*Figure 7*). Between 2012 and 2013, the number of pacemaker implantations per million population did not change significantly in Tunisia, Egypt, and Senegal, whereas Cameroon, Uganda, and Togo had a 20%, 46%, and 500% increase in the number of pulse generator implantations, respectively (*Table 4*). Between 2013 and 2014, however, SSA countries displayed significant fluctuation and variation in the implantation rates: Benin (+88%), Burkina Faso (+88%), Senegal (+41%), Cameroon (-42%),

Nigeria (-50%), and Togo (-83%). Algeria (0%) and Tunisia (-10%) were stable or marginally changed. The exceptions came from Morocco with significant changes (+29%) and Mauritius (+9%). The sawtooth trend seen in Togo (*Table 4*) depicts the dependence of pacing service of this country and others on visiting specialists. Unfortunately, this scenario is common in some SSA countries such as Guinea Conakry, where a French humanitarian mission implanted the first seven recycled pacemakers of the country in 2014⁸ without further actions afterward, as well as in other African countries.4,9 *Figure 8* shows the correlation between the cost of procedure, the GDP per capita, and the implantation density per country. It is clearly demonstrated that low income dramatically limits access to such expensive treatment modality, especially in the setting of pay-out-of-pocket health care access. To improve access to CIED, government

Table 2General characteristics of pacing activitiesamong 15 countries

Characteristics	n = 15 (%)	
Title of local investigator	Doctor	13 (87%)
	Professor	2 (13%)
Type hospital	Teaching hospital	9 (64%)
	Non-teaching hospital	3 (22%)
	Private hospital/clinic	2 (14%)
Isoprenaline availability	Yes	8 (57%)
	No	6 (43%)
Temporary stimulation	Yes	9 (60%)
when indicated	No	6 (40%)
Electrophysiological	Yes	1 (7%)
study performed	No	14 (93%)

should provide adequate implantation facilities, adequately trained personnel, and complete reimbursement. These characterizes the health care insurance policy of Mauritius and explains why this small country takes the lead on CIED implantation services in Africa (*Figure 5, Table 4*). Moreover, health expenditures per capita increased rapidly in those countries where the CIED implanting rate was higher (*Figure 3*); reinforcing the evidence of impact of public health policies in population health coverage. Tunisia, Mauritius, South Africa, and Algeria had the best health expenditures per capita progression (*Figure 3*) and pacing service (*Table 4*, *Figures 5, 7, 11*, and *12*).

Compared to statistics in western countries where single-chamber devices are implanted in the minority of cases, ^{14–17} in Africa the trends shows almost equal implantation rates in many countries (Figure 9A and B). In Mali, single-chamber pacing is the solely available procedure (Figure 9A), and in Cameroon and Mauritius dual-chamber pacing is less performed (Figure 9A and B). South Africa and Ghana are the sole countries where dual-chamber outweighed single-chamber pacing (Figure 9A). The main reason for this trend towards higher singlechamber pacing is the low cost of single chamber pacing and in conjunction with the lack of expertise required for dual-chamber pacing. All the five main brands of pacemakers are present in the countries investigated (Figure 10), with only few centres implanting all brands. Apart from South Africa, SSA lacks the presence of manufacturers, and local distributors are few. Therefore, EP physicians tend to establish contact with a brand that guarantees low device prices. This has the potential disadvantage of narrowing the choice and use of CIEDs.

Implantable cardioverter-defibrillators

General information

Figure 11 indicates the density of centres which offered ICD implantations. Implantations were done mostly in public hospitals (*Table 2*). Given the low implant rates of pacemakers in SSA, we assumed that ICD which is a quite expensive device was less implanted and their implant rates did not add new information. On the other hand, countries from North Africa and South Africa were compared to the European countries having comparable GDP per capita. The European countries had higher implantation rates (*Table 4*).

Number of cent	res, operatoi	rs, and cost o	f

procedures in every countries Centres Operators Cost of procedure (USD) (n) (n) Countries Single-Dualchamber chamber Algeria^a 19 n/a Free Free 2 2290 Benin n/a 1374 Burkina Faso 3 3 1448 1982 Cameroon 3 4 2000 2500 Chad^b 1 0 n/a n/a Congo Republic^b 1 0 n/a n/a Gabon 1 n/a n/a n/a 33 Egypt n/a n/a n/a Ethiopia 3 3 n/a n/a Ghana 2 2 n/a n/a Guinea Conakry^b 1 0 n/a n/a lvoryCoast n/a 2825 3282 n/a 7 2820 4230 Kenya n/a 2 Lybia 4 n/a n/a Mali 2 1 n/a n/a Mauritania 1 n/a 1832 2137 Morocco 13 112 n/a n/a Nigeria 12 15 n/a n/a Mauritius^a 8 50 free free Rwanda 2 n/a n/a n/a Senegal 4 11 1984 2290 173 South Africa 54 1030 1380 Sudan 8 14 1000 1480 7 Tanzania 2 free free Togo 1 1 2290 3053 Tunisia 60 130 860 1300

USD, United States dollar.

Uganda

Table 3

^aFull coverage in public hospitals.

1

^bThe pacemaker generator was free based on humanitarian donation, free referred to a national insurance system covering the implantation cost.

1880

2632

3

Implantable cardioverter-defibrillator facilities and implantation rate

As shown in *Figure 11*, the rate of ICD implantation was significantly low. Mauritius had the highest density of centres, followed by Tunisia and South Africa. Tunisia had the highest ICD implantation rate with 12.8 ICD implants per million population, whereas Germany claimed 295 per million population, representing a 23-fold difference.¹⁷ In fact, South Africa which had the highest GDP per capita on the continent had only 11.71 ICD implants per million population, whereas Serbia with a lower GDP per capita implanted almost six-fold more ICD in 2014 (*Table 5*).

Cardiac resynchronization therapy

General information

Figure 12 indicates the density of centres where CRT device implantations were performed. Most procedures were performed in public



	Pacemaker implanting rate per million population					
Countries	2011	2012	2013	2014	2015	2016
Nigeria	n/a	n/a	0.23	0.12	n/a	n/a
Burkina Faso	0.59	0.53	0.47	0.88	n/a	n/a
Guinea Conakry		n/a	n/a	0.59	n/a	n/a
Ghana	n/a	n/a	0.61	n/a	n/a	n/a
Benin	1.45	1.55	0.78	1.45	n/a	n/a
Togo	0.14	0.14	0.85	0.14	n/a	n/a
Mali	n/a	n/a	0.96	n/a	n/a	n/a
Uganda	0.46	0.69	1.05	n/a	0.66	n/a
Ivoary Coast	1.48	1.53	1.29	1.66	n/a	n/a
Kenya	n/a	1.42	1.72	2.84	5.06	7.42
Cameroon	1.62	2.21	2.66	1.53	1.89	1.67
Mauritania	n/a	n/a	n/a	6.97	n/a	n/a
Senegal	5.91	8.30	7.81	10.97	n/a	n/a
Lybia	n/a	n/a	7.98	n/a	n/a	n/a
Sudan	n/a	n/a	13.42	n/a	n/a	13.35
Egypt	n/a	30.00	33.00	38.00	40.54	n/a
Morocco	39.00	38.00	34.00	44.00	54.00	n/a
Algeria	n/a	n/a	65.00	65.00	76.00	n/a
South Africa	n/a	88.30	132.00	114.00	n/a	138.25
Tunisia	155.00	233.00	223.21	201.00	n/a	n/a
Mauritius	n/a	n/a	218.49	238.4	n/a	n/a

Table 4 Pacemaker implantation rates per million population from 2011 to 2016



Figure 6 Pacemaker implantation rate of countries in Africa compared with Europe. 1st Q, 2nd Q, 3rd Q, and 4th Q are based on the Raatikainen et al.¹⁵ classification. Source: ESC/EHRA White book 2014.



Figure 7 Pacemaker implantation trends among countries with at least three consecutive years of available data. Majority of the countries show positive trend. Five countries have pacemakers' implantation rate per million population <7 devices per million of population.

hospitals. Apart from South Africa and Kenya (from 2012), all SSA countries where CRT has been implanted were performed by visiting specialists. We believe that the low implant rates of CIED in SSA reflect a dearth of specialists in the technique and that the training

requirements have been less available. On the other hand, countries from Maghreb and South Africa were comparable to the European countries with similar GDP per capita (*Table 5*).

Cardiac resynchronization therapy facilities and implantation rate

Most countries where ICD implantation was available also offered CRT therapy (*Figure 12*) although CRTs were mostly performed by visiting specialists. The rate of CRT implantation was very low throughout the continent. Indeed, South Africa implanted only 14.59 CRT per million population, whereas Serbia with almost a similar GDP per capita implanted 45 devices per million population in 2014 (*Table 5*). Tunisia was the first African country with 16 CRT per million population when Germany implanted 128 devices per million population, representing an eight-fold difference.¹⁷

Catheter ablation

General information

Eight countries submitted data on EP studies and catheter ablations (*Figure 14*). Algeria, Egypt, Kenya, Libya, Morocco, Senegal, South Africa, and Tunisia reported somewhat consistent ablation procedures. No country keeps a national registry of catheter ablation, and the data were estimated by the centres where the procedures are performed. Only a few sub-Saharan countries have started EP procedures, mainly under the supervision of visiting specialists. South Africa is the only SSA country independently providing simple and complex ablation procedures.



Figure 8 Pacemaker implantation rate per ratio of implantation cost on GDP per capita. Pacemaker implantation cost rated by GDP per capita informed about the expense carried by such procedure regarding the population average wealth. The figure shows that countries with low ratio (mainly because of the existence of public health care insurance) tend to have higher pacemaker rate. ALG, Algeria; BEN, Benin; BFA, Burkina Faso; CMR, Cameroon; CIV, Ivory Coast; EGY, Egypt; KEN, Kenya; MAR, Morocco; MUS, Mauritius; NGA, Nigeria; SDN, Sudan; SEN, Senegal; TGO, Togo; TUN, Tunisia; ZAF, South Africa Republic.

	GDP per capita (USD)	Number of ICD implants		Number of CRT (CRT-P+ CRT-D) implants		
Country		Absolute number	Per million population	Absolute number	Per million population	
Ukraine	3104	57	1.29	85	2	
Morroco	3154	27	0.81	62	2	
Egypt	3328	236	2.72	530	6	
Tunisia	4272	140	12.8	180	16	
Georgia	4429	104	21.07	55	11	
Bosnia-Herzegovia	5194	55	14.21	23	6	
Algeria	5470	60	1.55	56	1	
Serbia	6200	457	63.39	321	45	
South Africa	6479	634	11.71	790	14.59	

Table 5 Comparison between eastern European countries and African countries

GDP, growth demographic product.

Italicized emphasis indicates African countries and unitalicized emphasis indicates Eastern European countries.

Source: ESC/EHRA White book.

Ablation facilities and procedure rates

Figure 14 shows that Senegal and South Africa are the only countries in SSA with EP service, although Senegal performed exclusively cavotricuspid isthmus for atrial flutter. North-Africa provided more access to interventional cardiac arrhythmias therapies. In Algeria, the number of ablations rose from 6 per million population in 2013 to 8 million per population in 2015. In Egypt, 11 procedures per million population were performed in 2012 and 16 per million in 2015. The trend was more sustainable in Tunisia with 56 per million population in 2011 and 78 ablations per million population in 2014.

Discussion

Current analysis shows that there are considerable variations in the availability of medical expertise, centres, and procedure rates among African countries.





The mean CIED implantation rates were markedly lower in the Western and Central African countries. Despite some progress over the last 6 years, there is still a clear unmet demand. Although the African population is younger than the European, and therefore less likely to need CIED therapy, the difference of more than 200-fold in the implantation rates is not fully explained by this alone.

The survey highlights several weaknesses in the management of arrhythmias in Africa: (i) the virtual absence of pacemaker implantation facilities in many countries, (ii) the very low CIED implant rates, (iii) the very low number of implanting centres, (iv) the low number of trained operators per million population, (v) the non-existence of EP studies and ablation techniques in SSA countries aside from Senegal where simple ablations (mainly atrial flutter) were started in 2014, and South Africa where CIED implantations and EP procedures have been practised for decades, and (vi) high cost of the CIEDs and the implantation procedure. In this survey, only Mauritius and Algeria offered free health care for CIED in the public sector. The mean cost of the procedure was USD 1778 and 2379 for single- and dualchamber pacemaker implantation respectively, which exceed the yearly earnings of the average citizen in most lower-income and middle-income countries.

Although recycled CIED have been shown to be a safe and efficient therapy and a viable alternative for low-incomes settings,^{10,11} many centres in Africa have not yet adopted this practice. This may reflect concerns over the long-term safety of this practice, access to recycled devices or due to the fact that this cost-saving solution deprives operators and distributors of income in the setting of generalized pauperization of medical profession.



Figure 10 Distribution of pacemaker brands in the African market. SJM, Saint Jude Medical/Abott; Sorin, Liva Nova.

Three brands dominate the African market, serving more than 70% of SSA. However, few of them have a local official distributor in many countries. This may partly be because the African CIED market is too small to attract manufacturers' interest. The prevailing low implantation rates deprive EP physicians of a market-basis for training opportunities sponsored by manufacturers and may contribute to a vicious cycle. Because international-standard fellowship programs are not provided, young physicians have limited access to training opportunities abroad.

The survey also demonstrates that the lack of reimbursement systems which is the commonest scenario in developing countries, in conjunction with a high cost of procedures in the setting of pay-out-of-pocket health care policies, may affect early detection and patient follow-up.^{4,5}

The indicators of good governance assessed (summarized in the *Table 1*), indicate that countries which aggregated high GDP per capita, life expectancy at birth, health expenditure as percentage of GDP or





Figure 12 Density rate of CRT implanting centres in 2013. Mauritius had the highest density of centres, followed by Tunisia and South Africa. Nigeria displayed the latest volume.



Figure 13 Number of centres per million population performing ablation procedures.

per capita, and human development index were those with the better cardiac arrhythmia services (*Figures 5, 7, 9A* and *B, 11, 12, 13*, and *14*).

Strengths and limitations

This multi-source approach to data collection allowed estimate of use of CIED in many African countries where national registries are not available. For the reliability of our statistics, we compared our information from Maghreb with the data published in EHRA white books (18), given that Algeria, Egypt, Lybia, Morocco, and Tunisia have annual report of their activities in this European database.

Although this report is the first attempt to provide complete data on CIED for the African continent, we acknowledge some limitations. Data collection was exclusively voluntary by physicians affiliated with the PASCAR working group on pacing and EP. Of the 31 countries where we knew EP physicians or had useful contact to share



Figure 14 Type of procedure existing in countries. Simple ablation includes radiofrequency ablation of flutter and junctional tachycardias, complex ablation refers to simple ablation and atrial fibrillation catheter ablation.

national statistics, 40% of countries did not respond necessitating the use of alternative methods of obtaining data. Obviously, data such as the rates of recycled pacemakers, the proportion of implantations by visiting specialists, and others are challenging to collect in this setting.

Perspectives

The ultimate short-term objective of the PASCAR is to provide ubiquitous access to therapy for cardiac arrhythmia, especially potentially life-saving treatment such as pacemaker implantation for complete heart block. The results of this study should serve as the PASCAR roadmap for convincing governments, manufacturers, and other stakeholders to invest in implantation facilities, minimize implantation cost, and increase local expertise by establishing fellowship programs through South–South and South–North partnership. The difficulties highlighted regarding management of arrhythmias is a reflection of the poor state of health care in SSA, a state which requires a comprehensive and concerted effort by government to improve access through the provision of adequate funding for infrastructure, training, and health care insurance.

Conclusion

Although in rise in most countries, pacemaker implantations remain suboptimal in sub-Saharan Africa, and more advanced techniques such as ICD, CRT, and ablation procedures are largely unavailable. High cost of procedures in the setting of pay-out-of-pocket policies, underuse of recycled devices, lack of national registries, and the deficit of trained specialists are major impediments to the management of cardiac arrhythmias in Africa.

Conflict of interest: none declared.

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