

# Updated Survey on Interventional Electrophysiology

## 5-Year Follow-Up of Infrastructure, Procedures, and Training Positions in Germany

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### ABSTRACT

**OBJECTIVES** This study provides an update and comparison to a 2010 nationwide survey on cardiac electrophysiology (EP), types and numbers of interventional electrophysiological procedures, and training opportunities in 2015.

**BACKGROUND** In 2010, German cardiology centers performing interventional EP were identified and contacted to provide a survey on cardiac EP.

**METHODS** German cardiology centers performing interventional EP in 2015 were identified from quality reports and contacted to repeat the 2010 questionnaire.

**RESULTS** A majority of 131 centers (57%) responded. EP (ablation procedures and device therapy) was mainly part of a cardiology department (89%) and only independent (with its own budget) in 11%. The proportion of female physicians in EP training increased from 26% in 2010 to 38% in 2015. In total, 49,356 catheter ablations (i.e., 81% of reported ablations in 2015) were performed by the responding centers, resulting in a 44% increase compared with 2010 (the median number increased from 180 to 297 per center). Atrial fibrillation (AF) was the most common arrhythmia interventionally treated (47%). At 66% of the centers, (at least) 2 physicians were present during most catheter ablations. A minimum of 50 (75) AF ablations were performed at 80% (70%) of the centers. Pulmonary vein isolation with radiofrequency point-by-point ablation (62%) and cryoablation (33%) were the preferred ablation strategies. About one-third of centers reported surgical AF ablations, with 11 centers (8%) performing stand-alone surgical AF ablations. Only one-third of the responding 131 centers fulfilled all requirements for training center accreditation.

**CONCLUSIONS** Comparing 2010 with 2015, an increasing number of EP centers and procedures in Germany are registered. In 2015, almost every second ablation was for therapy for AF. Thus, an increasing demand for catheter ablation is likely, but training opportunities are still limited, and most centers do not fulfil recommended requirements for ablation centers. (J Am Coll Cardiol EP 2018;■:■-■) © 2018 by the American College of Cardiology Foundation.

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**ABBREVIATIONS  
AND ACRONYMS****AF** = atrial fibrillation**DGK** = German Society of  
Cardiology**EHRA** = European Heart  
Rhythm Association**EP** = electrophysiology**OPS** = operation and procedure  
code(s)**PVI** = pulmonary vein isolation**VT** = ventricular tachycardia

Over the past 2 decades, clinical electrophysiology (EP), including device therapy and catheter ablation of arrhythmias, has rapidly developed as a subspecialty in cardiology. Catheter ablation is first-line therapy for regular supraventricular tachycardias and at least second-line therapy for most symptomatic patients with atrial fibrillation (AF). It has been estimated that about 60,000 catheter ablation procedures are performed per year in Germany (1). The increasing number of procedures and quality issues require national and international standards as well as trained specialists in the field of cardiac EP. National and international cardiology societies have developed training programs for a “heart rhythm specialist,” and the Accreditation Committee of the European Heart Rhythm Association (EHRA), American societies (American College of Cardiology, American Heart Association, and Heart Rhythm Society), and the German Society of Cardiology (DGK) have recently published curricula for clinical electrophysiologists (2–4). These curricula recommend requirements for training centers and trainees.

In view of this background, we performed a survey on infrastructure, training conditions, and procedure numbers in Germany in 2010, which served as a reference for the present survey (5). The purpose of this study was to provide a 5-year follow-up of this nationwide survey on cardiac EP, including types and numbers of electrophysiological studies and ablations performed in 2015 in Germany.

**METHODS**

German cardiology centers performing interventional EP were identified from (legally mandatory) quality reports of German hospitals (<http://www.dimdi.de/static/de/klasi/ops/anwendung/zweck/qualitaetsberichte/index.htm>). Hospitals reporting the following operation and procedure codes (OPS) were identified: 8-835.2 (radiofrequency ablation), 8-835.3 (irrigated radiofrequency ablation), 8-835.4 (ablation with other energy sources), 8-835.9 (mesh ablation), 8-835.a (cryoablation), and 8-835.8 (ablation with 3-dimensional mapping). The number of OPS is not necessarily identical to the number of ablation procedures performed, because more than 1 OPS (e.g., irrigated radiofrequency ablation plus ablation using 3-dimensional mapping) can be coded for a single ablation procedure. As previously (5), centers coding <30 ablation procedures were excluded from analysis. This cutoff was chosen because a small

number of coded ablation procedures increased the likelihood that the procedure itself was performed at a different hospital or by an external electrophysiologist (e.g., employed at another hospital). The head of the cardiology department or of interventional EP was contacted by e-mail and/or phone to answer a questionnaire that had already been used in the previous survey (5). The following parameters were queried: type of hospital, staff numbers and functions in cardiology and EP, sex, infrastructure, number and types of electrophysiological procedures, techniques used, imaging modalities, presence of or distance to cardiac surgery (for a detailed description, see Neuberger *et al.* [5]).

In addition to previous data (5), information on methods for protection of esophageal lesions during ablation of AF was collected. Data were made anonymous and sent to a statistical center. Descriptive statistics were analyzed using SPSS version 24.0 (SPSS, Chicago, Illinois).

**RESULTS**

According to OPS data, 327 centers coded ablation procedures in 2015. Among them were 97 centers that coded <30 catheter ablation procedures. Of the remaining 230 centers ( $n = 189$  in 2010), which coded  $\geq 30$  procedures, 131 (57%) responded. The completed questionnaires of these centers were used for analysis (Tables 1 to 4). Data came from 31 university hospitals (24%), 84 teaching hospitals (nonuniversity hospitals involved in training of medical students) (64%), 13 nonteaching hospitals (6.9%), and 3 private medical practices (1.6%) performing catheter ablations at a neighboring hospital.

**THE STRUCTURE OF INTERVENTIONAL EP.** EP (ablation procedures and device therapy) was mainly part of a cardiology department ( $n = 117$  of 131 [89.3%]), and only 14 centers were independent (with their own budgets; 10.7%). Ninety-three centers (70%) were officially certified training centers for interventional EP according to the EP curriculum of the DGK. In 2015, overall, 109 centers were officially certified for EP by the DGK (DGK, personal communication); thus 85% of those participated in the survey. Interventional EP was the main area of expertise of the head of the cardiology department at 28 centers (12%). At least 1 catheter laboratory was almost exclusively (>90%) used for EP in 88 centers (67%), whereas at the remaining centers ( $n = 43$  [33%]) the EP laboratory was used for non-EP procedures as well. At 18 centers (14%), at least 2 dedicated EP laboratories were available. An electroanatomical

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