Leveraging data mining to identify potential candidates for left atrial appendage closure (LAAC) therapy

A retrospective analysis of DRG data, based on ICD codes, CHA2DS2-VASc score and severe bleeding in patient history.

In patients with atrial fibrillation (AF), 90% of thrombi leading to stroke are formed in the left atrial appendage (LAA).[1] Although oral anticoagulants (OAC) significantly reduce the risk associated with AF, some patients remain contraindicated or intolerant. In order to reduce the risk of stroke in these non-valvular AF patients, LAAC is a percutaneous approach that has been shown to be safe and effective.[2,3] Nonetheless, the therapy still faces challenges in its deployment, one of them being candidate identification.

Objectives

Assess if a data mining approach using retrospective electronic medical record (EMR) diagnosis information (based on the International Classification of Diseases 10th Revision or ICD-10) can support the identification of potential candidates. The assessment will be attempting to identify patients who would have been suitable for left atrial appendage closure (LAAC) therapy within the inpatient hospital setting. The secondary objective is to improve interdisciplinary cross-departmental cooperation in the clinical decision making process.

Methods

We created a candidate selection query tool to analyse patients on the basis of common LAAC indications as defined in European Society of Cardiology guidelines[4] and consensus statements.[5,6] The tool was used by Sana Klinikum Berlin Lichtenberg on an anonymised dataset from their EMR, containing final diagnosis coding data at individual level. As a mandatory pre-selection, all

patients with atrial fibrillation (AF) who had been admitted to the hospital in the previous 11 months were analysed. All, as a prerequisite, were at least 65 years old and had either paroxysmal, persisting or permanent AF. Among these AF patients, a second query to analyse prior oral anticoagulant-related bleeding was performed.
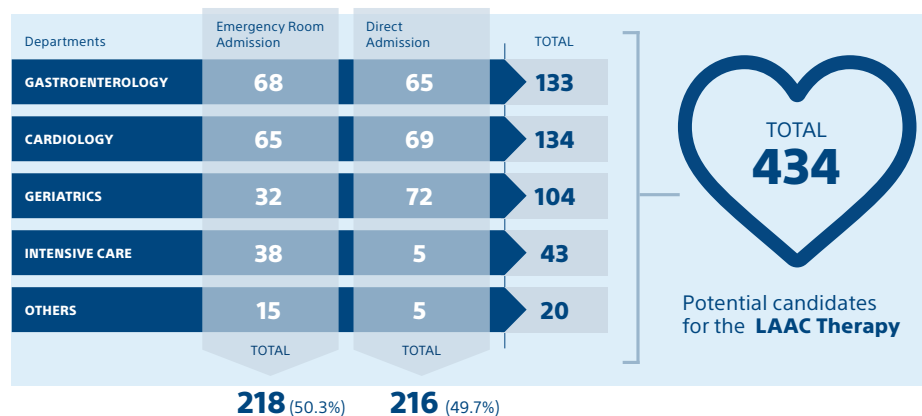
Ergebnisse

Out of the included hospital admissions (all with AF as either primary or secondary diagnosis), 2,233 unique patients (3,117 admissions) were identified with a CHA2DS2-VASc score[7] of 2 or higher. Out of these, 434 were considered as potential LAAC candidates as they had experienced a bleeding episode in the past or as part of the admission. 78 of these patients entered the hospital with an acute bleed.

50.3% (218 unique patients) of all potential LAAC candidates were admitted through the emergency room - 30.6% were patients admitted within the gastroenterology department,

30.9% were admitted within cardiology and 23.9% within the geriatric department. This clearly shows that an interdisciplinary approach is required to proactively identify LAAC candidates.

Furthermore, compared to Sana Klinikum Berlin Lichtenberg's LAAC programme size (15-20 patients per year), the analysis shows that there is a large group of potential LAAC candidates admitted into the cardiology department itself. These candidates have a history of bleeding and documented AF, but were admitted with a primary diagnosis related to another cardiac problem(s).

An additional manual validation performed by the Sana Klinikum Berlin Lichtenberg physicians on a sample of more than 30% of the potential candidates identified (n=136 out of 434) showed that 73.5% appear relevant for further LAAC screening. The main reason for candidates being marked as non-suitable were multi morbidity or palliative care (11.0%).

Departments	Emergency Room Admission	Direct Admission	TOTAL
GASTROENTEROLOGY	68	65	133
CARDIOLOGY	65	69	134
GERIATRICS	32	72	104
INTENSIVE CARE	38	5	43
OTHERS	15	5	20
	TOTAL	TOTAL	
	218 (50.3%)	216 (49.7%)	

TOTAL
434

Potential candidates for the **LAAC Therapy**

Conclusion

Out of all patients with AF and a CHA2DS2-VASc score of 2 or higher, 19.4% appeared to qualify as potential LAAC candidates based on the defined protocol. Considering the 73.5% (318 unique patients) relevancy rate of identified candidates for further LAAC screening, this indicates that 14.2% of AF patients cared for at Sana Klinikum Berlin Lichtenberg could qualify for the therapy.

Compared to the results of the GARFIELD[8] and ORBIT AF[9] cohorts that showed respectively that 9.8% (CHADS2 over or equal to 2) and 13.1% (all CHADS2 score) of the AF population suffers from a relative or absolute contraindication to OAC, this result appears slightly higher because of wider patient criteria set to avoid missing potentially relevant candidates (e.g. as per bleeding ICD codes used).

The approach taken in Sana Klinikum Berlin Lichtenberg shows that a data mining approach using retrospective information is suitable for candidate identification in less established therapies, such as LAAC. This was corroborated through manual validation of a sample representative of the identified candidate population and by comparison of the proportion of identified potential LAAC candidates within the AF population.

to rates previously published. The results highlight the need for a multi-disciplinary approach, as many suitable patients are admitted and treated in departments outside of cardiology, where LAAC is rarely discussed as a therapeutic option. These results should enhance the cooperation among different clinical departments and within the cardiology unit to drive appropriate adoption of this therapy.

Disclaimer

This white paper and the associated criteria for candidate identification were defined with Dr. Tessin and Dr. Göing, Boston Scientific providing technical support to deploy the data mining approach. Identification of a candidate through approach is not sufficient to ensure LAAC eligibility and do not dispense physician from further screening activities. The approach does not provide treatment recommendation. Results from case studies are not predictive of outcomes in other projects. Actual results in different environments may vary.

Material not intended for use in France.

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About

SANA Klinikum Berlin Lichtenberg

Sana Klinikum Lichtenberg is a multi-specialty centre in Berlin (Germany), with 641 beds and more than 1,000 employees. On a yearly basis, the hospital treats nearly 32,000 inpatients in addition to around 59,000 outpatient visits. The hospital is part of the Sana group, one of the biggest private hospital operators in Germany.

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