EFFECTS OF IMPROVED DETECTION AND TREATMENT OF ATRIAL FIBRILLATION ON BURDEN OF DISEASE CAUSED BY STROKE IN GERMANY

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Objectives

Atrial fibrillation (AF) is a major risk factor for stroke with a prevalence of approx. 1-2% of the general population. Patients suffering from non-valvular AF show a 4 to 5 times higher risk of stroke. According to a German registry study, AF goes undetected in about one third of affected patients(1). Even if correctly diagnosed, AF is not always treated with oral anti-coagulants (OAC) according to current treatment guidelines. In Germany, the estimated proportion of patients actually treated with OAC among all eligible AF-patients ranges from 38% to 83%(1, 2, 3). Studies have shown that AF detection can be improved by "opportunistic screening" in primary care (pulse taking and invitation to electrocardiography if pulse was irregular) (8).

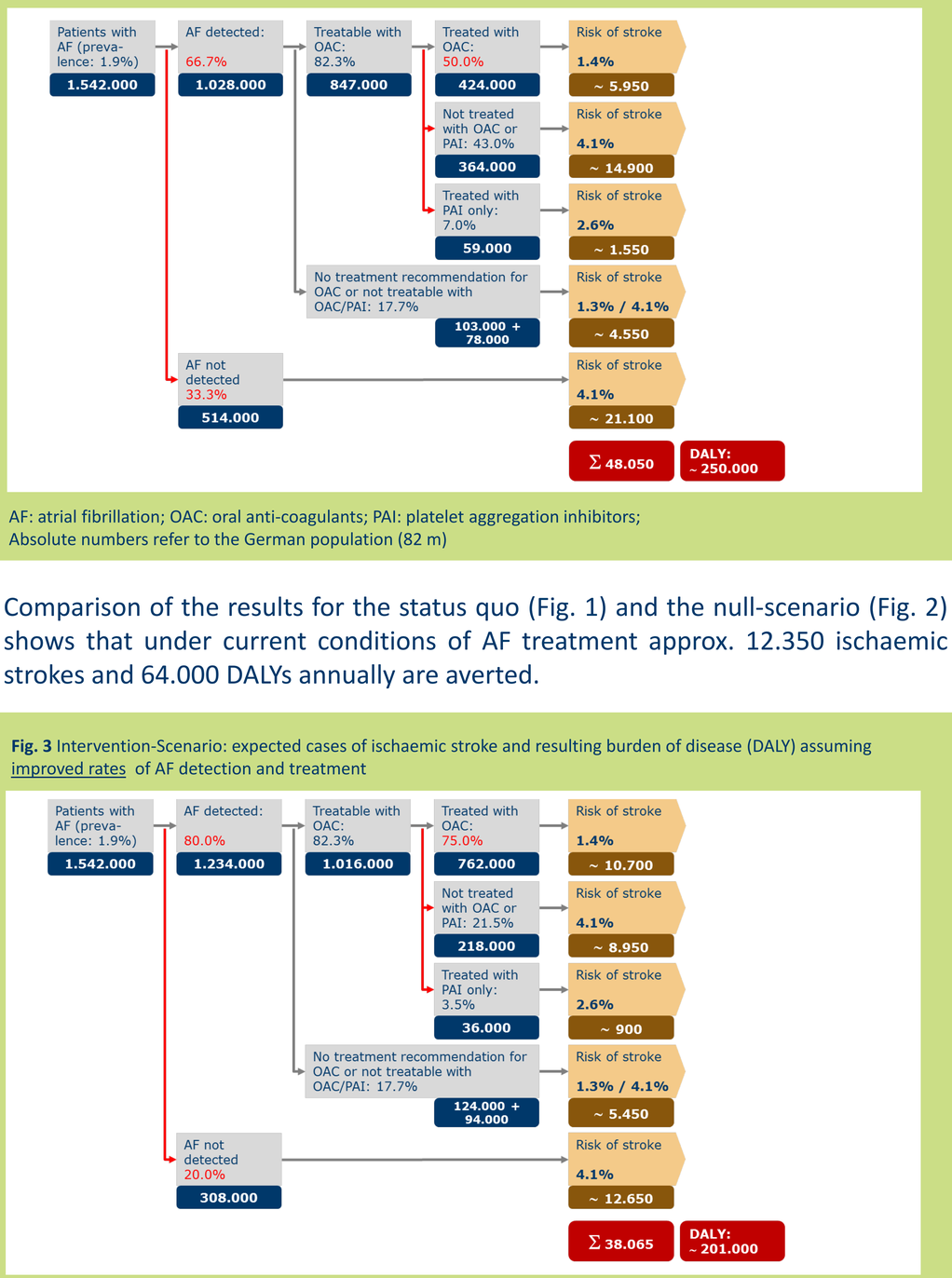
We estimated the effects of improved detection and treatment of AF with OAC on the burden of disease (disability adjusted life years, DALY) caused by first ischaemic strokes in Germany.

Methods

We performed a simulation study, applying the methodology of Generalized Cost-Effectiveness Analysis (GCEA)(4). Using German registry data(5) of stroke incidence and outcomes (modified Rankin Scale, mRS), we estimated the burden of disease (DALY) from first strokes under status quo conditions of AF care. Using study results on the effectiveness of AF-treatments, we estimated a counterfactual null-scenario (no AF-treatment at all) and calculated the resulting burden of disease. As a last step, we simulated possible improvements of AF detection and treatment rates (intervention scenario) and estimated the resulting reduction of DALYs. Years of life lost (YLL) were estimated from registry data about hospital mortality after stroke and published results of the differential reduction of life expectancy of stroke survivors (hazard ratios for mRS-grades)(6). For the calculation of years lived with disability (YLD) we used published disability weights for mRS-Grades(6). For the current rate of detection of AF (66,7%) we relied on the results of Palm et al.(1). Approximately 10% of patients with AF have a CHA_2-DS_2-VASc-Score <2 for whom OAC treatment is not recommended or optional (1,2,3). For these patients we assumed an annual stroke risk equivalent to a CHA_2-DS_2-VASc-Score of 1 (1.3% (9)). Of those with recommended OAC-treatment approx. 8.5% have contraindications(2). For this subgroup we assumed a stroke risk equal to untreated AF-Patients (4.1%). Effectiveness of AF therapies (OAC, TAI) was modeled as annual risk of stroke; parameters were taken from the meta-analysis of Hart et al. (7).

Results

Fig. 1 Status quo-Scenario: expected cases of ischaemic stroke and resulting burden of disease (DALY) assuming current rates of AF detection and treatment

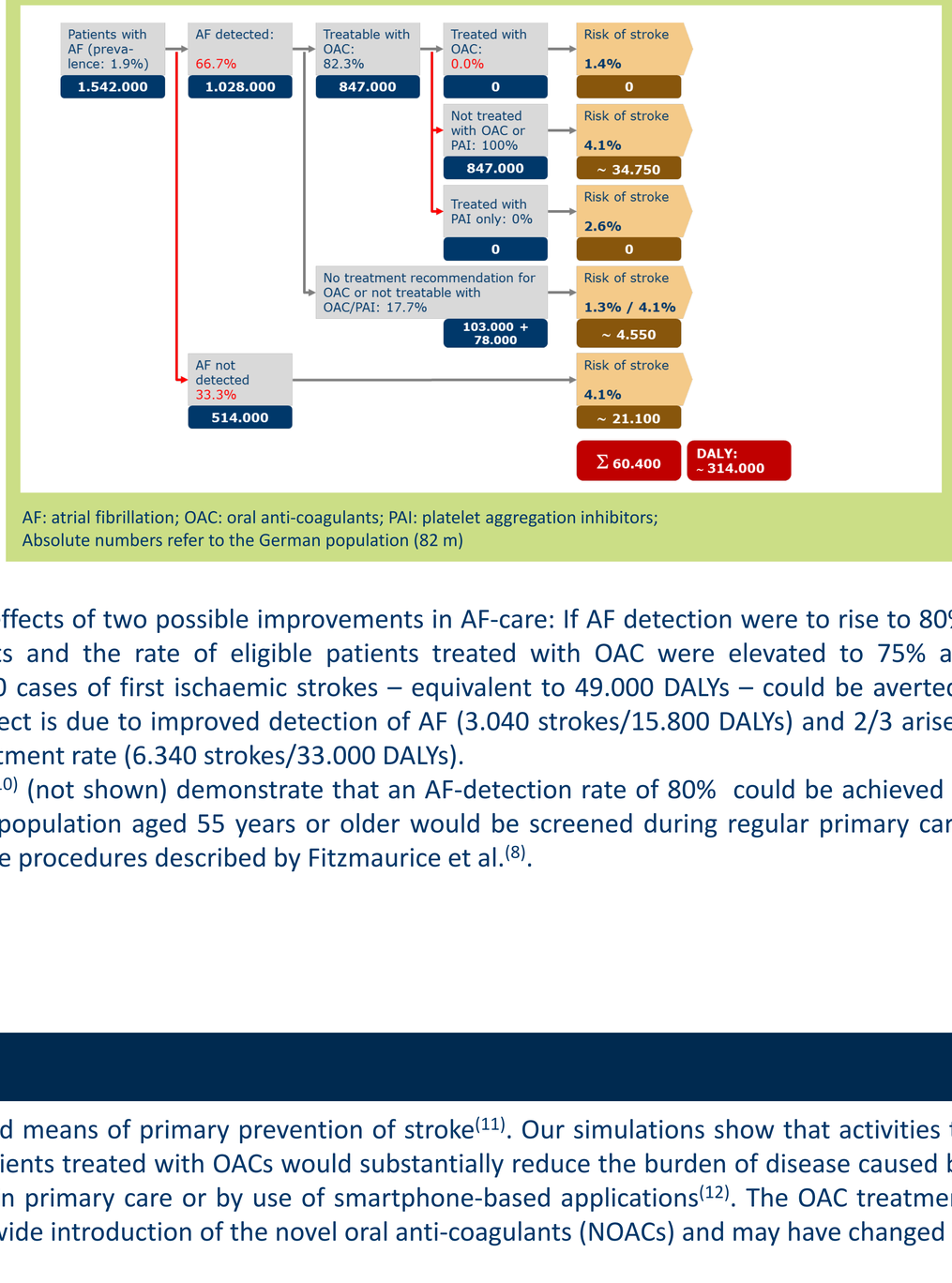


AF: atrial fibrillation; OAC: oral anti-coagulants; PAI: platelet aggregation inhibitors;
Absolute numbers refer to the German population (82 m)

Figure 1 shows the modeling results for the Status quo-Scenario in which ca. 1/3 of the true AF-prevalence remains undetected. 82.3% of the patients identified are assumed to be eligible for OAC treatment. About half of these patients currently receive OAC treatment, another 7% are treated with PAI only and 43% go without any specific AF treatment.
In this scenario one would expect 48.050 cases of ischaemic stroke p.a. for the population of patients with AF in Germany representing a burden of disease of approx. 250.000 DALY.

To estimate the effectiveness of the current pattern of AF detection and treatment in Germany we modeled a null-scenario in which the treatment rates (OAC and PAI) were set to null and calculated the resulting burden of disease (Fig. 2).

Fig. 2 Null-Scenario: expected cases of ischaemic stroke and resulting burden of disease (DALY) without any AF treatment



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Comparison of the results for the status quo (Fig. 1) and the null-scenario (Fig. 2) shows that under current conditions of AF treatment approx. 12.350 ischaemic strokes and 64.000 DALYs annually are averted.

Fig. 3 Intervention-Scenario: expected cases of ischaemic stroke and resulting burden of disease (DALY) assuming improved rates of AF detection and treatment

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Figure 3 shows the effects of two possible improvements in AF-care: If AF detection were to rise to 80% of prevalent patients and the rate of eligible patients treated with OAC were elevated to 75% an additional ca. 10.000 cases of first ischaemic strokes – equivalent to 49.000 DALYs – could be averted. About 1/3 of the effect is due to improved detection of AF (3.040 strokes/15.800 DALYs) and 2/3 arises from the higher treatment rate (6.340 strokes/33.000 DALYs).
Further simulations(10) (not shown) demonstrate that an AF-detection rate of 80% could be achieved if approx. 45% of the population aged 55 years or older would be screened during regular primary care visits according to the procedures described by Fitzmaurice et al.(8).

Conclusions

Atrial fibrillation is a major risk factor for ischaemic stroke. Treatment of AF with OACs is an acknowledged means of primary prevention of stroke(11). Our simulations show that activities to enhance the detection of AF in the population >= 55 years in combination with a higher rate of eligible patients treated with OACs would substantially reduce the burden of disease caused by ischaemic stroke in Germany. AF detection could be improved by relatively simple screening procedures in primary care or by use of smartphone-based applications(12). The OAC treatment rates found by epidemiological studies that we used in the status quo-scenario reflect the situation before wide introduction of the novel oral anti-coagulants (NOACs) and may have changed in the meantime.

References

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