

Changes in oral anticoagulant prescribing for atrial fibrillation related stroke: **A budget impact analysis**

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AF and stroke risk

- In England, around 2.5% of the population (~1.4 million people) is estimated to have AF¹
- Around one-third of strokes are associated with AF
- The risk of stroke in people with AF is increased fivefold
- Oral anticoagulants (OACs) are an effective way of preventing strokes in patients with non-valvular AF

Analysis overview

- Warfarin is an established and low-cost OAC but requires frequent and expensive monitoring
- Direct OACs (DOACs) have been increasingly prescribed in the past 9 years
- They can be given once daily without monitoring
- Although cost-effective, DOACs cost 40 to 100 times more than warfarin while on patent
- ICHP estimated the budget impact of changes in OAC prescribing

Data sources

- AF-related stroke prevalence and OAC prescribing data were derived from the following sources:

Hospital Episode Statistics database (HES)	Patients with finished consultant episodes from 1 March 2010 to 28 February 2018
The electronic Prescribing and Costing Tool (ePaCT)	Total number of items prescribed for branded and unbranded warfarin and for DOACs
Quality and Outcomes Framework (QOF)	Anonymised annual prevalence and treatment data for AF summarised at the national level, collected in March each year

Budget calculations (1)

- Budget impact was compared for the periods 2011–2013 and 2015–2017
- Total stroke healthcare cost per patient in the 1 year after stroke was £13,452^{2,3}
- The number of people using warfarin was derived from the total mgs prescribed a year divided by the average dose

Total dose warfarin / 356 days / 4.5 (average dose) = average number of patients

- Warfarin costs were calculated by total prescriptions using ePACT Net Ingredient Cost (NIC) plus monitoring costs, calculated as

NIC for warfarin + (average number of patients × £242 (default cost of monitoring))

2. Xu XM, Vestesson E, Paley L, Desikan A, Wonderling D, Hoffman A, Wolfe CD, Rudd AG, Bray BD. The economic burden of stroke care in England, Wales and Northern Ireland: using a national stroke register to estimate and report patient-level health economic outcomes in stroke. *Eur Stroke J* 2018;3:82-91.

3. Youman P, Wilson K, Harraf F, Kalra L. The economic burden of stroke in the United Kingdom. *Pharmacoeconomics* 2003;21(suppl 1):43-50.

Budget calculations (2)

- DOAC prices were set at the NHS Electronic Drug Tariff basic for each drug
- The per-person cost for each study year for DOACs was calculated as

Total number of tablets prescribed per year / doses per day (1 or 2)
/ 356 days / total number of patients prescribed DOACs

Change in OAC prescriptions

- Warfarin prescriptions did not substantially differ between time periods
- But DOAC prescriptions increased substantially
- Overall, around **1 million additional people** with non-valvular AF were treated with a DOAC

	2011–2013	2015–2017	Difference (%)	Difference (total)
Estimated number of people taking warfarin	2,042,056	2,059,186	1%	17,130
Estimated number of people taking DOACs	31,506	1,023,956	3,250%	992,450

Budget impact: OAC prescribing

- A cost breakdown shows an overall increase in OAC prescribing costs of **nearly £700 million**

	2011–2013	2015–2017	Difference (%)	Difference (total)
Prescription costs of warfarin (NIC)	£52,615,522	£54,014,012	3%	£1,398,490
Estimated INR monitoring costs	£494,177,644	£498,323,012	1%	£4,145,368
Prescription costs of DOAC (NIC)	£24,952,522	£707,385,341	2,735%	£682,432,819
OAC overall prescription costs	£77,449,332	£761,395,869	882%	£683,946,537
OAC overall prescription costs plus monitoring	£571,745,688	£1,259,722,365	120%	£687,976,677

NIC=net ingredient cost.

Stroke reduction

- AF-related stroke prevalence decreased between the two study periods by nearly **10,000** strokes (–13%)
- The overall stroke healthcare cost also decreased

	2011–2013	2015–2017	Difference (%)	Difference (total)
Total number of hospitalised AF-related strokes ^a	74,500	64,763	–13%	–9,737
Hospitalised AF-related stroke healthcare costs ^b	£1,002,174,000	£871,191,876	–13%	–£130,982,124

^aAfter adjustment for AF prevalence. ^bHealthcare costs in the one year after stroke, including transport, scans, thrombolysis, acute care, rehabilitation and daily living assistance, based on a cost per patient of £13,452

Budget impact: incremental costs

- The incremental cost of OAC treatment increased with the changes in prescribing patterns
- But, when offset against the falling stroke prevalence, an overall **saving in incremental cost per patient** can be seen

	2011–2013	2015–2017	Difference (%)	Difference (total)
Incremental cost of OAC treatment	£275.73	£408.58	48%	£133
Incremental cost of OAC treatment offset against the costs of AF-related stroke	£759.04	£691.15	-9%	-£67.89

Conclusions

- Nearly **1 million** more people with AF were being treated with an OAC in 2015–2017, helping to close a significant gap in care
- This gain was mainly driven by substantial increases in DOAC prescriptions, which led to a **983%** rise in prescribing costs
- However, closing this treatment gap reduced stroke prevalence in the AF-population by around **10,000 strokes**
- When OAC prescribing costs are offset by reduced stroke prevalence, the incremental costs show **savings in the system overall**

Limitations

- OAC prescriptions are not linked to indications, preventing identification of patients taking warfarin for non-AF conditions (eg, DVT/PE)
- All DOAC doses were, therefore, included
- However, most patients taking OACs do so for AF
- For consistency, we assumed that all OAC prescriptions were for AF
- These factors mean that a formal cost-effectiveness calculation is not possible

Next steps

- Strategies to maximise stroke prevention in people with AF while mitigating costs will be worthwhile
- An additional Difference-in-Differences analysis of these data sets has shown that high DOAC prescribing patterns are directly associated with a reduction in AF-related stroke prevalence
- Future analysis will involve linked datasets of patients taking warfarin and DOACs to assess risk factors and effects in different patient subsets
- E.g. if DOACs are being used in higher-risk patients than warfarin, further opportunities might exist to close care gaps further

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