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LATEST GUIDELINES FOR PREVENTING AND MANAGING ATRIAL FIBRILLATION FOLLOWING CARDIAC SURGERY: A UK PRACTICE SURVEY

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Abstract:

Introduction: *There are differing recommendations from various organizations for preventing post-cardiac surgery POAF. To define "usual care" for a platform trial of intervention to stop and prevent POAF following heart surgery, a survey of UK practice was carried out. All current guidelines for the prevention and management of atrial fibrillation (AF) following cardiac surgery were examined in order to set the scene for the survey.* ***Objectives****: About 30% of individuals experience postoperative atrial fibrillation (POAF), the most frequent complication following heart surgery.*

Design*: Literature review and online survey. The survey was completed by all 35 UK National Health Service Cardiac Surgery Centers. Specialty societies' and other organizations' guidelines from North America, Europe, and the United Kingdom were examined.* ***Participants:*** *A link network of researchers was established.*

Measurements and Key Findings*: The literature review found five pertinent guidelines'-blockade is advised by all guidelines to prevent AF following heart surgery. It is advised to treat AF with either rate or rhythm control. Cardio version is only advised for patients who are thermodynamically unstable. Anticoagulation should be considered for patients who stay in AF for more than 48 hours. Patients should get antiarrhythmic and anticoagulant therapy after being monitored for 60 days.31 (89%) out of 35 centers responded. Eleven out of thirty-one (35.5%) centers followed local guidelines for the prevention of POAF, four (13%), and the Society of Cardiovascular Anesthesiologists/European Association of Cardiothoracic Anesthesia guidelines. Guidance from the UK National Institute of Health and Care Excellence and 4 adhered to "other" guidelines. Eight (26%) of the 31 centers did not follow any protocols to prevent POAF, and 28 (90%) of the 31 centers did not risk-stratify their patients for POAF. The majority of centers (23 out of 31 and 74%), did not have a care package in place to avoid POAF, but 14 out of 31 (45%) tried to prevent AF in patients who presented with sinus rhythm. B-blocker use postoperatively (23/31,74%), magnesium (20/31,64.5%), and maintaining serum K+ ~4.5 mmol/L (26/31,84%) are the most common therapies to prevent POAF.*

Conclusions: *B-blockade is the mainstay of advice on how to avoid AF following heart surgery. B-blockade and maintaining serum K+ and Mg2+ levels are the two main therapies utilized to avoid POAF, even though people in the UK don't seem to be at risk for it.*

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INTRODUCTION:

In the UK, about 32,000 adults undergo heart surgery in 35 centers annually.[1] About 30% of patients experience postoperative atrial fibrillation (POAF), the most frequent complication following heart surgery. An episode of POAF increases hospital stays by 12 to 24 hours, stays in the intensive care unit (ICU) for 2 to 5 days, and nearly triples the in-hospital and 1-year mortality rates following heart surgery from 0.5% to 3.3% and 3.7% to 9.9%, respectively. In the first year following surgery, [3-6] POAF raises the cost of healthcare for each affected patient by about £10,000.[7]. For these reasons, the James Lind Alliance Cardiac Surgery Priority Setting Partnership, which was created in 2019 by patients, families, and medical professionals, selected prevention of POAF as one of the top 10 research goals.[8]

More than 23 interventions (pharmacological and non-pharmacological) have been studied to prevent POAF.[9] The majority of studies focus on perioperative efficacy and do not include safety information.[10] The volume and quality of evidence for the effectiveness of many of these interventions to prevent prolonged hospital stays in the short term and stroke in the mid- and long-term are low. The high incidence and prevalence of POAF after heart surgery has led to the creation of several guidelines by specialist societies and organizations centered around the prevention of POAF and the management of POAF once it has occurred.[11] Surveys conducted in 2017 before the most recent Society of Cardiovascular Anesthesiologists (SCA)/European Association of Cardiothoracic Anesthesia (EACTA) guidelines revealed wide variation across the United States, Europe, and the UK in the implementation of intervention stop event POAF after cardiac surgery.

However, no studies have been conducted since the guidelines were published, so it is currently unknown how much practice has changed and whether variation in practice has decreased. As a result, the authors conducted a survey to describe current UK practice regarding the prevention and management of POAF after cardiac surgery. To set the scene for the survey, guidelines for the prevention and management of POAF after cardiac surgery were reviewed and summarized.

METHOD:

Review of Guidelines:

The search was restricted to healthcare systems such as those in the UK (UK, Europe, United States, Canada, Australia, and New Zealand). Only guidelines that specifically pertain to the prevention and management of AF after cardiac surgery were included. Where a guideline had been updated, only the most recent version was taken into consideration. Specialist societies (cardiac surgery, cardioanesthesia, intensive care medicine, and cardiology) and other national health-care guideline providers were contacted for publications of guidelines relating to the prevention and management of POAF.

Survey:

This study did not require formal ethical approval, according to the UK Health Research Authority.[12] A brief online (Survey Monkey) survey with 14 questions (four about demographics, one about the definition of POAF, one about what percentage of patients develop POAF, one about the use of guidelines, two about risk stratification, three about care packages to prevent POAF and to whom this is applied, two about specific interventions used to prevent and treat POAF, and one about The UK Health Research Authority confirmed that this study did not require formal ethical approval.[12] A multidisciplinary research team created a brief online (SurveyMonkey) survey with 14 questions (four about demographics, one about the definition of POAF, one about what percentage of patients develop POAF, one about the use of guidelines, two about risk stratification, three about care packages to prevent POAF and to whom this is applied, two about specific interventions used to prevent and treat POAF, and one about further contact) (See Supplementary Material).Four clinicians with content expertise and three non-experts (from a patient and public involvement group) piloted the survey and provided feedback on its readability, clarity, and ease of completion.

Data from the online survey were analyzed using the Survey Monkey analysis tool and Microsoft Excel (CA). The survey was distributed to all 35 centers performing cardiac surgery in the UK, contacted using established links for multiple previous surveys of UK cardiac surgical practice.[13,14] Sites were defined by geography rather than NHS Trust, and the most appropriate clinician (such as anesthetists or surgeons) was identified and asked to complete the survey based on their institutional, rather than personal, practice.

RESULTS:

Review:

It was determined that five guidelines were pertinent to include in the view. The Canadian Heart Association (AHA)/American College of Cardiology (ACC) in 2023, the Canadian Cardiovascular Society (CCS)/Canadian Heart Rhythm Society (CHRS) in 2020, the European Society of Cardiology (ESC)/European Association of Cardiothoracic Surgery (EACTS) in 2020, the SCA/EACTA in 2018, the UK National Institute of Health and Care Excellence (NICE) in 2021, and

the Canadian Cardiovascular Society (CCS)/CHRS in 2020 all produced these guidelines.10. Although Australasia produced guidelines for the management of AF, the perioperative context was not specifically covered. The formulation of only two guidelines (ACC and NICE) specifically included systematic evidence reviews. Table 1 summarizes the recommendations from various guidelines.

Table 1:Comparison of Guidelines for the Prevention of Atrial Fibrillation After Cardiac Surgery

Prevention of AF	CCS	AHA/ACC	SCA/EACTA	ESC/EACTS	NICE
Continuation of b-blockade	1st Line	"High-risk" only	1st Line	1st Line	1st Line
New b-blockade	1st Line		1st Line		1st Line
Amiodarone	2nd Line	"High-risk" only	1st Line ("high-risk" only)	1st Line	1st Line
Rate-limiting calcium channel blocker					1st Line
Intravenous magnesium	3rd Line				
Sotolol			X		
Biatrial pacing	3rd Line		X		
Colchicine	3rd Line		X		
Corticosteroids			X		
Posterior pericardiectomy	3rd Line	X			
Management of AF	**CCS**	**AHA/ACC**	**SCA/EACTA**	**ESC/EACTS**	**NICE**
Rate or rhythm control	1st Line	1st Line	X	Based on symptoms	1st Line
DCCV	2nd Line	2nd Line (instability)	2nd Line (instability)	2nd Line (instability)	
Anticoagulation	X	X	X	X	X
Follow up	6-12 wk	30-60 d			

Abbreviations: ACC, American College of Cardiology; AF, atrial fibrillation; AHA, American Heart Association; CCS, Canadian Cardiovascular Society; DCCV, DC Cardioversion; EACTA, European Association of Cardiothoracic Anaesthetists; EACTS, European Association of Cardiothoracic Surgeons; NICE, UK National Institute of Health and Care Excellence; SCA, Society of Cardiovascular Anesthesiologists.

The CCS and ESC/EACTS guidelines were developed through a "comprehensive appraisal of the evidence," but no information regarding the methodology was provided. The SCA/EACTA guidelines reviewed other guidelines and condensed the information into a practice advisory. A panel of experts developed all of the guidance; patients were not directly involved in the development of the NICE guidelines (two lay members are members of NICE working groups and committees). All of the guidance, with the exception of NICE, was produced with a graded class of recommendations and appraisal of the evidence. A separate document of the evidence appraisal was published alongside the NICE guidelines.

Survey

31 (89%) out of 35 centers finished the survey. Tables 2 and 3 contain the complete results. As a whole, 26 out of 31 (84%) centers thought that the rate of new POAF was between 26% and 50% of their patients; 8 out of 31 (26%), centers followed no guidelines to avoid AF; 11 out of 31 (35.5%) centers followed local guidelines for POAF prevention, while only 4 centers (13%), followed the SCA/EACTA standards, and another 4 centers (13%), followed NICE guidelines. Four centers claimed to have used "other guidance," although they did not define it.

Definitions of AF

The idea of AF is only partially defined in three of the guidelines (ACC, ESC, and CCS). According to ESC recommendations, an ECG trace demonstrating a cardiac rhythm with consistent R-R intervals (when atrioventricular conduction is

unimpaired) lasting roughly 30 seconds and no detectable p-waves is considered to be indicative of AF. The AHA/ACC guidelines define AF in the same way as the ESC recommendations, however they specifically do not include a duration. Although AF must remain for at least 30 seconds, the CCS guidelines don't specify any ECG criteria for what exactly qualifies as AF. The idea of AF is not defined in the SCA/EACTA and NICE recommendations. Instead of using the ESC guidance of about 30 seconds after their definition of POAF, 17 out of 31 (55%) centers in the current survey used the definition of any A for supraventricular tachycardia (with or without electrocardiogram rhythm strip evidence).

Risk Stratification

The majority of centers (23/31,74%) did not have a care package in place to prevent POAF, while 28 (90%) did not risk-stratify their patients for the risk of POAF. Of the three centers that risk-stratified, two used operative intervention alone, one used the SCA/EACTA guidelines, one used the POAF score, and one used the EUROSCORE2 (respondent could choose more than one option).

Table 2: Survey Responses From 31 of 35 UK Cardiac Surgery Centers

Survey Question	N (%)
What definition of AF after cardiac surgery does your centre use?	
Any AF/SVT reported by clinical staff	8 (26%)
Any AF/SVT with ECG/rhythm strip evidence	9 (29%)
AF/SVT lasting more than 30 s	1 (3%)
AF/SVT lasting more than 30 s with ECG/rhythm strip evidence	6 (19%)
AF/SVT requiring intervention	4 (13%)
Other	3 (10%)
What percentage of patients in your centre (who are in sinus rhythm before their operation) do you think experience AF after cardiac surgery?	
<25%	5 (16%)
26-50%	26 (84%)
51-75%	0
>75%	0
Does your centre follow any guidelines for the prevention of AF?	
SCA/EACTA	4 (13%)
NICE	4 (13%)
Canadian Cardiovascular Society	0
Local (hospital) guidelines	11 (35.5)
Our centre does not follow any guidelines	8 (26%)
Other	4 (13%)
Does your centre *routinely* risk-stratify patients for the risk of getting AF after cardiac surgery?	
Yes	3 (10%)
No	28 (90%)
Which risk calculator does your centre use to stratify the risk of AF after cardiac surgery?	
Use age alone as a predictor	0
Use operative intervention alone as a predictor (eg, valve surgery)	2 (6.5%) SCA/EACTA guidelines 1 (3%)
COM-AF score	0
POAF score	1 (3%)
HATCH score	0
Our unit does not risk-stratify patients	26 (84%)
Other	1 (3%)
Do you have a care package to prevent AF in your centre?	
We don't have a care package	23 (74%)
We have a care package and apply it to all patients	7 (23%)

We have a care package and we apply it to high-risk patients only	1 (3%)
In what proportion of cardiac surgical patients who are in sinus rhythm does your centre routinely try to prevent AF?	
None	10 (32%)
<25%	4 (13%)
26-50%	3 (10%)
51-75%	0
>75%	14 (45%)

"Local" guidelines refer to center-specific guidance.
Abbreviations: AF, atrial fibrillation; COM-AF, Combined Risk Score to Predict Atrial Fibrillation after Cardiac Surgery; EACTA, European Association of Cardiothoracic Anesthesiologists; ECG, electrocardiograph; HATCH, hypertension, age, transient ischemic attack, chronic obstructive pulmonary disease, and heart failure; POAF, postoperative atrial fibrillation; SCA, Society of Cardiovascular Anesthesiologists; SVT, supraventricular tachycardia.

Prevention

For patients who are currently on b-blockade, three guidelines (SCA/EACTA, NICE, and CCS) expressly advise continuing it during the perioperative phase.[10, 11, 15,] All patients having heart surgery should be offered short-term b-blockade, according to four guidelines (SCA/EACTA, CCS, ESC/EACTS, and NICE). B-blockers are only advised for "high-risk" patients, according to AHA/ACC guidelines. Offering amiodarone as a substitute for b-blockers to all patients in order to prevent AF following heart surgery is equally important according to NICE and ESC/EACTS. During the postoperative phase, 23 out of 31 (74%) UK facilities used b-blockers, most frequently bisoprolol.

NICE also recommends an alternative of a rate-limiting calcium channel blocker (e.g., ditiazem) for prevention, although they acknowledge that this is outside its UK license of use. This is confirmed by the current survey, which shows that only three (10%) centers use rate-limiting calcium channel blockers. The SCA/EACTA and AHA/ACC guidelines only recommend amiodarone for "high-risk" patients, and the CCS only recommends it for patients for whom b-blockade is contraindicated.

In order to prevent POAF, 26 (84%) of the 31 centers maintained a serum K+~4.5 mmol/L (mEq/L), which is not advised by any of the guidelines. While 20 out of 31 (65%) centers in the current survey reported utilizing magnesium, only the CCS advises using intravenous magnesium to prevent POAF. Magnesium use was split between intravenous administration of 8 to 20 mmol (mEq=2.5g) and serum level maintenance of approximately 0.8 mmol/L (mEq/L). The ESC/EACTS recommends balancing electrolytes, including magnesium, but it makes no mention of what "normal" could be or how to fix it.

Only one facility reported taking colchicine preoperatively, despite the fact that both the CCS and the SCA/EACTA advise using it as an anti-inflammatory drug to prevent POAF. Once more, only one center reported taking corticosteroids, despite the SCA/EACTA's recommendation to use them as an anti-inflammatory therapy. Regarding nonpharmacological measures, the AHA/ACC and CCS both suggest post-pericardiectomy as a surgical approach, while the CCS suggests biatrial pacing as a possibility (as reported by 12 of 31 centers). Only one clinic, nevertheless, reported preventing POAF with a posterior pericardiotomy. The MAZE technique (3/31%), digoxin (2/2,6.5%), statins (6/31,19%), and sotolol (2/31,6.5%) were among the other therapies employed by UK hospitals to prevent AF.

Table 3: Interventions Used to Prevent and Manage Postoperative Atrial Fibrillation

	Used to Prevent AF N (%)			Used to Treat AF N (%)	
	Preoperatively	Intraoperatively	Postoperatively		Do Not Use N (%)
Nondihydropyridine calcium channel blockers (verapamil, diltiazem)	2 (6.5%)	1 (3%)	1 (3%)	3 (10%)	18 (58%)
Amiodarone (bolus)	1 (3%)	4 (13%)	2 (6.5%)	27 (87%)	0
Amiodarone (infusion)	1 (3%)	4 (13%)	4 (13%)	28 (90%)	0
Amiodarone (bolus and infusion)	0	3 (10%)	4 (13%)	26 (84%)	0
b-blockers	11 (37%)	3 (10%)	23 (74%)	23 (74%)	0
Colchicine	0	0	1 (3%)	1 (3%)	18 (58%)
Steroids	0	1 (3%)	0	0	19 (61%)
Digoxin	2 (6.5%)	2 (6.5%)	3 (10%)	19 (6%)	5 (16%)
Sotolol	2 (6.5%)	0	1 (3%)	6 (19%)	13 (42%)
Propafenone	0	0	0	0	20 (64.5%)
Procainamide	0	0	0	1 (3%)	19 (61%)
Magnesium	3 (10%)	14 (45%)	20 (64.5%)	20 (64.5%)	1 (3%)
Statins	3 (10%)	0	6 (19)	0	10 (32%)
Maintaining K+ :::4.5 mmol/l (mEq/L)	3 (10%)	15 (48%)	26 (84%)	22 (71%)	1 (3%)
Atrial pacing	0	4 (13%)	8 (26%)	5 (16%)	12 (39%)

Abbreviation: AF, atrial fibrillation.

Management

The guidelines for the management of AF after cardiac surgery are much more cohesive. All four guidelines recommend electrical cardiac reversal only for patients who are hemodynamically unstable (NICE makes a statement on this). NICE and the CCS also make a statement on which medications to use for rate and rhythm control. The other guidelines all recommend either a b-block or a calcium channel blocker that limits heart rate.

The CCS, AHA/ACC, and ESC/EACTS guidelines all expressly ask for follow-up to reevaluate the necessity for oral anticoagulation and antiarrhythmics. According to this study, the most popular methods for treating an elderly AF after it has already happened were magnesium (20/31,65%), amiodarone (28/31,90%), cardioversion (25/31,81%), and maintaining K+~4.5mmol/L(mEq/L) (22/31,71%). The Supplementary Material contains comprehensive dosage guidelines for interventions (prevention and management).

DISCUSSION:

This study has demonstrated that, despite the fact that many of the guidelines pertain to "high-risk" patients, patients in the UK do not appear to be risk-assessed for POAF, and there is variation amongst centers regarding the definition of POAF and the guidelines that are adhered to for prevention and management. According to all guidelines, b-blockers should be started in most patients for the short-term prevention of POAF if they are not already taking them, and they should be continued throughout the perioperative cardiac surgery period. This is what three-quarters of UK centers do. Most UK centers do not use amiodarone for prevention, but the AHA/ACC and SCA/EACTA guidelines advise it to be "considered" for AF prevention, especially in "high-risk" individuals or those who are contraindicated to b-blockers. Although none of the UK's standards encourage maintaining serum K+ and Mg2+ levels, 85% and 65% of centers do so, respectively.

Guidelines generally agree that either a b-blocker, a rate-limiting calcium channel blocker, or amiodarone can be administered to control rate or rhythm if AF occurs. Thermodynamically unstable patients should not undergo electrical cardio version. Amiodarone and/or b-blockers are used to treat AF in more than three-quarters of UK clinics. Calcium channel blockers are only used in three centers. It is advised that patients take oral anticoagulants if their AF lasts more than 48 hours

and there is a sufficient recovery period after surgery to make the risk of bleeding tolerable.

The joint SCA/EACTA Practice Advisory11 for the prevention of AF following heart surgery should have standardized practices in the US, UK, and Europe. In terms of risk stratification, this is undoubtedly not the case for the UK. Risk assessment for POAF would enable interventions to be targeted at the most effective patients, and even the most basic ratification by age and surgical type (valve and/or coronary artery bypass graft)19 may offer good predictive accuracy.

According to the evidence evaluations in the NICE guidance, studies "reported adverse effects inconsistently, and there was no assessment of cost-effectiveness for any intervention." Amiodarone was the subject of these investigations. Many centers probably do not employ amiodarone to treat POAF because practitioners will be reluctant to use preventative measures if adverse events cannot be quantified. Because AF's elevated heart rate counteracts the perceived risk of bradycardia, centers feel much more at ease using amiodarone after AF has occurred. cardio version is also widely used, though it's unclear from the survey if this is limited to individuals who are thermodynamically unstable as recommended by the guidelines.

The survey's high center response rate and ability to give a thorough picture of UK practice are its main advantages. Though it could be made sure that they did not speak solely for themselves, it is constrained by the fact that only one person was requested to represent their institution and reflect institutional practice. In order to increase survey completion efficiency, cardiac surgery was also handled as a whole rather than by operation, which could conceal variations in treatment for various procedures. When there is no long-term therapy for them, such as in the case of isolated aortic valve replacement with severe stenosis, clinicians may be less inclined to administer drugs such b-blockers following surgery.

Prior to the publication of the current guidance, surveys were conducted.11.These earlier surveys looked at individual rather than institutional practices, which would have produced more accurate responses but generally less responsive and possibly less generalizable results because there might have been a difference between those who answered the survey and those who didn't. The main drawback of individual approaches is that the denominator for the sampling is frequently unclear; in large institutions, it can be challenging to determine which persons are relevant because the ward and/or floor care team, critical care team, and operating room team are frequently managed by different individuals. The goal of one individual giving an overview of institutional practice is to document care in each of these contexts. Prior polls were also carried out in the UK, Europe, and the United States. Once more, variations in other aspects of the standard care approach may result in heterogeneity in the application of interventions.21 However, when it comes to using interventions to prevent AF after heart surgery, 74% of centers have consistently focused on using b-blockers, which was not the case in a survey conducted prior to the most recent guidelines11, which had two groups of practitioners: those who rarely used b-blockade for AF prevention and those who always did. The latter group cited fear of bradycardia and a systole as reasons for their non-use. While the adverse events associated with b-blockers during the perioperative period are well-studied and characterized, those of nearly all other interventions are not—something supported by the evidence-based guidelines.20

Respondents were familiar with the idea of answering on behalf of their institution and understood the purpose of the survey, which was to map the care pathway regarding prevention of POAF after cardiac surgery and define "usualcare" for a pragmatic trial. An established link network used for multiple previous surveys of UK cardiac surgical practice was used,13,14.

Over twenty-three interventions have been investigated to prevent POAF.9.There is little evidence supporting any of the strategies used by clinicians to prevent AF. According to NICE, "many of the reviewed studies were old and included small numbers of participants." The committee agreed that they could not recommend a specific class of drugs based on such scant evidence because there were few studies comparing drug classes.10.The ESC/EACTS guidelines classify this as class I evidence, while the AHA/ACC guidelines classify b-blockade for prevention as class 2a.The CCS considers the initiation of new b-blockers to be low-quality evidence and the continuation of existing b-blockers to be high-quality evidence. There is little information about these electrolytes in any evidence-based guidance because the evidence base for K+ and Mg2+ controversy is much lower.

The Tight-K research (NCT04053816),22 a large, randomized trial of K+control method after coronary artery bypass graft, has completed recruiting and is currently being analyzed to answer the data addressing the place of K+. Since there is now little evidence to support magnesium's ability to prevent POAF, a randomized controlled experiment with sufficient power is still necessary.

The efficacy and safety of nearly every other intervention must be assessed.

Cardiovascular surgery centers should adhere to the available evidence-based guidelines, even though there is little evidence to support the effectiveness of any particular intervention to prevent atrial fibrillation. One problem is that there are numerous guidelines in this area, each with slightly different recommendations. The variations in interpretation described above further complicate matters for those who are putting the guidelines into practice. Guidelines like the ESC/EACTS also include algorithms of care that include numerous interventions that are not stated or advised in the evidence review (e.g., optimization of electrolytes). This confusion is exacerbated by the fact that multiple guidelines cover the same geographic area (for example, the UK is subject to SCA/EACTA, ESC/EACTS, and NICE guidance).

All clinics and centers should adhere to these guidelines in order to reduce unnecessary care variation and gather momentum. Reducing unnecessary variation in care enhances care quality, lowers complications, and improves outcomes.23The fact that there are currently several non-aligned standards suggests that there is a lack of high-quality data to support them. National research funds with the financial means to supply this evidence, such as the National Institutes of Health [United States] and the National Institute for Health and Care Research [United Kingdom], are starting to do so (e.g., the NIHR-funded PARADISE-AF [NIHR131227] for risk prediction of POAF after cardiac surgery).

According to this review and survey of guidelines, the standard treatment in the UK for preventing post-ac surgery POAF is the use of b-blockers, which is in accordance with guidelines, followed by a measurement of serum potassium and magnesium concentrations, which is not. Little risk assessment is used to identify patients who are more likely to have POAF, and as a result, interventions are not as well targeted. Randomized controlled trials are still necessary to assess the safety, cost-effectiveness, and effectiveness of almost all interventions.

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