3-year scoping report

Topic: SIGN 152 Cardiac arrhythmias in coronary heart disease

Literature published (2016–2021) since last searches for SIGN 152 (late 2015)

Date of search: September/October 2021

Searched by: Joanna Kelly, Jenny Harbour

Key concepts: Arrhythmias, fibrillation, flutter, tachycardia, bradycardia.

Summary of findings

The purpose of this 3-year scoping is to establish what evidence has been published since publication of SIGN 152 (September 2018), and whether any sections of the guideline require updating. A rapid search of the literature was conducted, using a predefined list of resources.

Chair's comments

Comment
The following content has been received from the Chair of the guideline development group, Prof. Derek Connelly, by email: 'There are always new pieces of evidence arising, and there were new guidelines on Atrial Fibrillation published by the European Society of Cardiology in August 2020 that are relevant.' *[The following guidelines from the European Society of Cardiology were found based on the above comment: Cardiac pacing and resynchronization (2021) and Atrial fibrillation (2020). Relevant recommendations are outlined in the next section of this scoping report.]*

‘Two studies that spring to mind that are potentially guideline-changing: the EAST-AFNET study was a trial of early rhythm control for patients with atrial fibrillation, published a year ago. It showed a (modest) survival advantage for early intervention with cardioversion + antiarrhythmic drugs to restore / maintain a normal rhythm. The study population was very "representative" with a lot of elderly patients, a significant proportion of whom had several comorbidities including cognitive impairment.

More recently, Michele Brignole et al published the APAF-CRT trial which showed that, in patients hospitalised with atrial fibrillation and heart failure, a strategy of ablation of AV nodal conduction and implantation of a CRT pacemaker produce better survival than medical therapy. Dramatic results - but a very small trial (130 patients).

Here's another important trial [LAAOS III] (and, unusually, it's in cardiac surgery).

In this randomised trial in patients with a history of AF undergoing cardiac surgery (e.g. for valve disease or coronary artery disease), left atrial appendage occlusion significantly reduced the long-term risk of stroke (over & above the effect of anticoagulant drugs). Deserves consideration and probably a recommendation.’

[Trials highlighted by the chair were: APAF-CRT (2021); EAST-AFNET (2020); LAAOS III (2021). The trials have been included in the scoping report below.]

Prof. Connelly also raised the issue of ‘whether a 12-lead ECG is essential if AF is diagnosed by a handheld single-lead ECG device (e.g. Kardia AliveCor or Apple watch).’ Whereas the NICE guidance recommends a 12-lead ECG, the most recent (2020) ESC AF guidelines state that a single-lead ECG is often of sufficient quality to make the diagnosis and start treatment.

‘A lot of evidence on AF detection by wearable ECG devices (and other techniques, e.g. plethysmography) has accumulated over the past few years, and as part of our review / update for SIGN I think it would be appropriate for us to look at the evidence that the ESC used to come to their decision.’

[The recommendation from ESC states: ‘ECG documentation is required to establish the diagnosis of AF. A standard 12-lead ECG recording or a single-lead ECG tracing of ≥30 s showing heart rhythm with no discernible repeating P waves and irregular RR intervals (when

atrioventricular conduction is not impaired) is diagnostic of clinical AF.' This is based on an analysis of a prospective registry by Steinberg et al (2018) – included in the scoping report below.]

Finally, Prof. Connelly highlighted the RATE-AF trial.

SIGN 152 section 5.1.4 states that "Digoxin does not control rate effectively during exercise and should be used as first-line therapy only in people who are sedentary, or have overt heart failure"

This recent clinical trial from Birmingham refutes this. In this trial, quality of life measures in patients treated with digoxin were in some cases better than in patients treated with a beta-blocker (bisoprolol). *(Details are included in the scoping report below).*

2.0 Relevant evidence and implications for SIGN recommendations

2.1 New Guidelines

Reference	Details	How does this potentially change current recommendations?
[Guideline] National Institute for Health and Care Excellence. Atrial fibrillation: diagnosis and management. NG196. 2021.	The update includes several new recommendations – added in 2021. Those which appear to differ from SIGN 152 are listed below, but follow the link to see all the recommendations. Perform a 12-lead electrocardiogram (ECG) to make a diagnosis of atrial fibrillation if an irregular pulse is detected in people with suspected atrial fibrillation with or without symptoms.	Diagnosis of atrial fibrillation is not included in SIGN 152, but the recommendation from NICE is at odds with a recommendation in the ESC guideline, which suggests AF can be diagnosed using a

		handheld single-lead ECG device (highlighted by Prof. Connelly)
	In people with suspected paroxysmal atrial fibrillation undetected by 12-lead ECG recording: • use a 24-hour ambulatory ECG monitor if asymptomatic episodes are suspected or symptomatic episodes are less than 24 hours apart • use an ambulatory ECG monitor, event - recorder or other ECG technology for a period appropriate to detect atrial fibrillation if symptomatic episodes are more than 24 hours apart.	Diagnosis of atrial fibrillation is not included in SIGN 152. The evidence on ambulatory ECG monitors has expanded in recent years. An SHTG Assessment on the use of ambulatory devices to detect PAF in people with newly diagnosed stroke was also published in May 2021. The group may want to consider the emerging evidence base around mobile health apps.
	When discussing the benefits and risks of anticoagulation use clinical risk profiles and personal preferences to guide treatment choices. Discuss with the person that: • for most people the benefit of anticoagulation outweighs the bleeding risk • for people with an increased risk of bleeding, the benefit of anticoagulation may not always outweigh the bleeding risk, and careful monitoring of bleeding risk is important.	This may be of relevance to section 6.4.1 of SIGN 152. There is not currently a statement about the benefit of anticoagulation not always outweighing the bleeding risk.
	The new NICE guidance has several new recommendations around pharmacological therapy for rate control. These appear to largely be in line with SIGN 152. There was one additional recommendation in NICE:	Most of the recommendations around pharmacological treatment for rate control appear to be in agreement. Consider the additional

	• Do not offer amiodarone for long-term rate control If drug treatment is unsuccessful, unsuitable or not tolerated in people with symptomatic paroxysmal or persistent atrial fibrillation: • consider radiofrequency point-by-point ablation or • if radiofrequency point-by-point ablation is assessed as being unsuitable, consider cryoballoon ablation or laser balloon ablation. Consider antiarrhythmic drug treatment for 3 months after left atrial ablation to prevent recurrence of atrial fibrillation, taking into account the person's preferences, and the risks and potential benefits. Reassess the need for antiarrhythmic drug treatment at 3 months after left atrial ablation Do not start statins in people having cardiothoracic surgery solely to prevent postoperative atrial fibrillation. In people having cardiothoracic surgery who are already on statins, continue this treatment. For further advice on statins for the prevention of cardiovascular disease, see NICE's guideline on cardiovascular disease: risk assessment and reduction. Consider either a rhythm-control or rate-control strategy for the initial treatment of new-onset postoperative atrial fibrillation after cardiothoracic surgery.	statements in NICE, for example about amiodarone. Laser balloon ablation is not mentioned in SIGN 152 – otherwise the recommendations appear to agree. There is not a recommendation on this in SIGN 152. There is not a recommendation on this in SIGN 152. This appears to be slightly different to a recommendation in section 6.4.1 which states that: In the immediate postoperative period, patients with persistent AF should be treated with a rhythm-control strategy.

	If a rhythm-control strategy is chosen, reassess the need for antiarrhythmic drug treatment at a suitable time point (usually at around 6 weeks) In people with a diagnosis of atrial fibrillation, do not stop anticoagulation solely because atrial fibrillation is no longer detectable. Base decisions to stop anticoagulation on a reassessment of stroke and bleeding risk using CHA2DS2-VASc and ORBIT and a discussion of the person's preferences	There is no equivalent recommendation in SIGN 152.
[Guideline] Glikson M, Nielsen JC, Kronborg MB, Michowitz Y, Auricchio A, Barbash IM, et al. ESC Guidelines on cardiac pacing and cardiac resynchronization therapy. Eur Heart J. 2021;42(35):3427–520.	There are 79 new recommendations in the 2021 update to the ESC resynchronisation guideline. These recommendations cover: • Evaluation of the patient with suspected or documented bradycardia or conduction system disease *(monitoring, carotid massage, tilt test, exercise test, imaging, lab tests, sleep evaluation, electrophysiological study, genetics)* [15 recommendations] • Cardiac pacing for bradycardia and conduction system disease [8 recommendations] • Cardiac resynchronisation therapy [5 recommendations] • Alternate site pacing *(His bundle pacing, leadless pacing)* [7 recommendations] • Indications for pacing in specific conditions *(pacing in acute MI, pacing in cardiac surgery, pacing in trancatheter aortic valve implantation)* [15 recommendations] • Various syndromes *(neuromuscular diseases, muscular dystrophy, Kearns-Sayre syndrome)* [5 recommendations] • Sarcoidosis [2 recommendations]	These guidelines have not been referenced in the current SIGN 152. I have listed the categories of new recommendations in 2021 and recommendations from 2013 that were modified in 2021. There are too many recommendations to realistically determine what impact they would have on the current SIGN 152 guideline.

	• Special considerations on device implantations and perioperative management [11 recommendations] • Management considerations *(remote monitoring, temporary pacing)* [8 recommendations] • Miscellaneous *(mainly individual risk benefit analysis and patient centred care)* [3 recommendations] Eight changes have been made to recommendations from the 2013 version of the guideline. These cover: cardiac pacing for bradycardia and conduction system disease; cardiac resynchronisation therapy; specific indications for pacing; and management considerations.	
[Guideline] [Highlighted by Prof. Connelly] Hindricks G, Potpara T, Dagres N, Arbelo E, Bax JJ, Blomström-Lundqvist C, et al. 2020 ESC Guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS). Eur Heart J. 2021;42(5):373–498.	There are 41 new recommendations in the latest update of the ESC atrial fibrillation guidelines. The new recommendations cover: • Diagnosis of AF (1 recommendation) • Structured characterisation of AF (1 recommendation) • Screening to detect AF (1 recommendation) • Integrated AF management (1 recommendation) • Prevention of thromboembolic events in AF (5 recommendations) • Cardioversion (2 recommendations) • Rhythm control/catheter ablation for AF (7 recommendations) • Stroke risk management peri-cardioversion (3 recommendations) • Stroke risk management peri-catheter ablation (2 recommendations) • Long-term anti-arrhythmic drugs (3 recommendations) • Lifestyle interventions and management of risk factors and concomitant diseases in AF (4 recommendations)	The previous edition of these guidelines is referenced in the current SIGN 152. I have listed categories of new recommendations for 2020 and recommendations that have changed since the last edition. It is possible that some of the categories in the ESC guideline are covered by other SIGN guidelines e.g. CVD prevention and risk management, stroke, and do not need to be considered by the arrhythmias group.

	• Patients with AF and an acute coronary syndrome, percutaneous coronary intervention, or chronic coronary syndrome (2 recommendations) • Management of active bleeding on oral anticoagulants (1 recommendation) • Management of AF during pregnancy (4 recommendations) • Postoperative AF (2 recommendations) • Sex-related differences in AF (1 recommendation) • Quality measures in AF (1 recommendation) Seventeen recommendations have been updated in the 2020 version. The amended recommendations cover: integrated AF management, prevention of thromboembolic events in AF, rhythm control/catheter ablation, stroke risk management peri-cardioversion, stroke risk management peri-catheter ablation, long-term anti-arrhythmic drugs, lifestyle interventions and management of risk factors and concomitant diseases in patients with AF, stroke prevention in AF patients after ICH, postoperative AF.	

2.2 Evidence specific to guideline sections

Section 3.3 Defibrillation

Reference	Details	How does this potentially change current recommendations?

[Cochrane systematic review] Faddy SC, Jenning PA. Biphasic versus monophasic waveforms for transthoracic defibrillation in out-of-hospital cardiac arrest. Cochrane Database of Systematic Reviews 2016, issue 2.	Conclusion: It is uncertain whether biphasic defibrillators have an important effect on defibrillation success in people with out of hospital cardiac arrest (OHCA). Results: The review found four trials (n=552) that compared biphasic and monophasic waveform defibrillation in people with OHCA. Two trials were at high risk of bias, one trial was at unclear risk of bias and one trial had low risk of bias. There was no statistical heterogeneity in any analysis. No studies reported adverse events. The results were not statistically significant for comparison of biphasic and monophasic defibrillation for the outcomes of return of spontaneous circulation (ROSC), failure to defibrillate on first shock, failure to defibrillate after one to three stacked shocks, failure to achieve ROSC after first shock, risk of death before hospital admission, or risk of death before hospital discharge. • ROSC RR 0.86 (95%CI 0.62 to 1.20; four trials, 552 participants) • Failure to defibrillate on the first shock RR 0.84 (95% CI 0.70 to 1.01; three trials, 450 participants) • Failure to defibrillate after one to three stacked shocks RR 0.81 (95% CI 0.61 to 1.09; two trials, 317 participants) • Failure to achieve ROSC after first shock RR 0.92 (95% CI 0.81 to 1.04; two trials, 285 participants) • Risk of death before hospital admission RR 1.05 (95% CI 0.90 to 1.23; three trials, 383 participants) • Risk of death before hospital discharge RR 1.05 (95% CI 0.78 to 1.42; four trials, 550 participants)	There is currently no recommendation on biphasic versus monophasic defibrillation. Evidence on this topic in the current SIGN guideline is level 4. This systematic review at least brings the level of evidence up, although there are no statistically significant results reported.

Section 5.1.2 Atrial Fibrillation: Antiarrhythmic drugs

Reference	Details	How does this potentially change current recommendations?
Valembois L, Audureau E, Takeda A, Jarzebowski W, Belmin J, Lafuente-Lafuente C. Antiarrhythmics for maintaining sinus rhythm after cardioversion of atrial fibrillation. Cochrane Database of Systematic Reviews 2019, Issue 9.	There is high-certainty evidence of increased mortality associated with sotalol treatment, and low-certainty evidence suggesting increased mortality with quinidine, when used for maintaining sinus rhythm in people with atrial fibrillation. We found few data on mortality in people taking disopyramide, flecainide and propafenone, so it was not possible to make a reliable estimation of the mortality risk for these drugs. However, we did find moderate-certainty evidence of marked increases in proarrhythmia and adverse effects with flecainide. Overall, there is evidence showing that antiarrhythmic drugs increase adverse events, increase proarrhythmic events and some antiarrhythmics may increase mortality. Conversely, although they reduce recurrences of atrial fibrillation, there is no evidence of any benefit on other clinical outcomes, compared with placebo or no treatment.	A previous version of this review was included in SIGN 152. The conclusions have changed slightly, but don't appear to alter what is currently in the guideline.

Section 5.1.3 Atrial Fibrillation: Rhythm control

Reference	Details	How does this potentially change current recommendations?
[RCT] [Highlighted by Prof. Connelly] Kirchhof P *et al*; EAST-AFNET 4 Trial Investigators. Early Rhythm-Control Therapy in Patients with Atrial Fibrillation. N Engl J Med. 2020 Oct 1;383(14):1305-1316.	Conclusion: Early rhythm-control therapy was associated with a lower risk of adverse cardiovascular outcomes than usual care among patients with early atrial fibrillation and cardiovascular conditions.	Prof. Connelly states: 'the EAST-AFNET study was a trial of early rhythm control for patients with atrial fibrillation, published a year ago. It showed a (modest) survival advantage for early intervention with cardioversion + antiarrhythmic drugs to restore / maintain a normal rhythm. The study population was very "representative" with a lot of elderly patients, a significant proportion of whom had several comorbidities including cognitive impairment.'

Section 5.1.4 Atrial Fibrillation: Pharmacological therapies for rate control

Reference	Details	How does this potentially change current recommendations?
BMJ Best Practice (2021) Chronic atrial fibrillation. URL: Chronic atrial fibrillation - Symptoms, diagnosis and treatment | BMJ Best Practice (oclc.org) *Section on Digoxin – references this paper:* Lopes RD, Rordorf R, De Ferrari GM, et al. Digoxin and mortality in patients with atrial fibrillation. J Am Coll Cardiol. 2018 Mar 13;71(10):1063-74	BMJ Best Practice state: Digoxin is not considered a first-line agent for the purpose of rate control, but it can be useful in patients with heart failure. A study explored whether digoxin use was independently associated with increased mortality in patients with AF. Compared with propensity score–matched control participants, the risk of death (adjusted hazard ratio [HR]: 1.78; 95% CI: 1.37 to 2.31) and sudden death (adjusted HR: 2.14; 95% CI: 1.11 to 4.12) was significantly higher in new digoxin users. In patients with AF taking digoxin, the risk of death was independently related to serum digoxin concentration and was highest in patients with concentrations of at least 1.2 nanograms/mL. (Lopes *et al.)*	These new studies may be relevant to section 5.1.4. The recommendations relating to digoxin are: 'Ventricular rate in AF should be controlled with beta blockers, rate-limiting calcium channel blockers (verapamil or diltiazem), or digoxin and combination therapy may be required.' 'Digoxin does not control rate effectively during exercise and should be used as first-line therapy only in people who are sedentary, or have overt heart failure.' 'A combination of digoxin with either a beta blocker or diltiazem should be considered to control heart rate in patients with atrial fibrillation.'
BMJ Best Practice (2021) Atrial flutter. *Referenced this systematic review:* Sethi NJ, Nielsen EE, Safi S, Feinberg J, Gluud C, Jakobsen JC. Digoxin for atrial fibrillation and atrial flutter: A systematic review with meta-analysis and trial sequential	The objective was to: 'objective was to assess the benefits and harms of digoxin for atrial fibrillation and atrial flutter based on randomized clinical trials.' The authors concluded: 'The clinical effects of digoxin on all-cause mortality, serious adverse events, quality of life, heart failure, and stroke are unclear based on current evidence. Digoxin seems to be superior compared with placebo in reducing the heart rate, but inferior compared with beta blockers. The long-term effect of digoxin is unclear, as no trials reported long-term follow-up. More	

analysis of randomised clinical trials. PLoS One. 2018 Mar 8;13(3):e0193924.	trials at low risk of bias and low risk of random errors assessing the clinical effects of digoxin are needed.'	Could the group consider whether this new evidence should result in any changes to the guideline?
[Highlighted by Prof. Connelly] Kotecha D, Bunting KV, Gill SK, Mehta S, Stanbury M, Jones JC, et al; Rate Control Therapy Evaluation in Permanent Atrial Fibrillation (RATE-AF) Team. Effect of Digoxin vs Bisoprolol for Heart Rate Control in Atrial Fibrillation on Patient-Reported Quality of Life: The RATE-AF Randomized Clinical Trial. JAMA. 2020 Dec 22;324(24):2497-2508.	This RCT (n=160) compared low-dose digoxin with bisoprolol (a β-blocker). The authors concluded that: 'Among patients with permanent atrial fibrillation and symptoms of heart failure treated with low-dose digoxin or bisoprolol, there was no statistically significant difference in quality of life at 6 months. These findings support potentially basing decisions about treatment on other end points.'	

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Section 5.1.5 Atrial Fibrillation: Non-pharmacological therapies

Reference	Details	How does this potentially change current recommendations?
BMJ Best Practice (2021) Chronic atrial fibrillation. URL: Chronic atrial fibrillation - Symptoms, diagnosis and treatment | BMJ Best Practice (oclc.org) *Highlights following articles on catheter ablation versus medical therapy for atrial fibrillation:* Mark DB, Anstrom KJ, Sheng S, et al. Effect of catheter ablation vs medical therapy on quality of life among patients with atrial fibrillation: the CABANA randomized clinical trial.	One multi-centre randomised trial, the Catheter Ablation versus Anti-arrhythmic Drug Therapy for Atrial Fibrillation (CABANA) trial, found that, compared with medical therapy, catheter ablation led to improvements in quality of life (Mark *et al)*, but did not significantly reduce a composite end point of death, disabling stroke, serious bleeding, or cardiac arrest (Packer *et al.).*	This new trial probably does not change the recommendations in the guideline, but it would be useful to get the opinion of clinical experts.

JAMA. 2019 Apr 2;321(13):1275-85. Packer DL, Mark DB, Robb RA, et al. Effect of catheter ablation vs antiarrhythmic drug therapy on mortality, stroke, bleeding, and cardiac arrest among patients with atrial fibrillation: the CABANA randomized clinical trial. JAMA. 2019 Apr 2;321(13):1261-74		
[Highlighted by Prof. Connelly] Brignole M *et al.* AV junction ablation and cardiac resynchronization for patients with permanent atrial fibrillation and narrow QRS: the APAF-CRT mortality trial. Eur Heart J. 2021 Aug 28:ehab569.	Conclusion: Ablation + CRT was superior to pharmacological therapy in reducing mortality in patients with permanent AF and narrow QRS who were hospitalised for HF, irrespective of their baseline EF.	Prof. Connelly states: 'More recently, Michele Brignole et al published the APAF-CRT trial which showed that, in patients hospitalised with atrial fibrillation and heart failure, a strategy of ablation of AV nodal conduction and implantation of a CRT pacemaker produce better survival than medical therapy. Dramatic results - but a very small trial (130 patients).'
[Systematic review and meta-analysis] AlTurki A, Proietti R, Dawas A, Alturki H, HuynhT, Essebag	Conclusions: Compared to medical therapy, catheter ablation for AF was associated with a significant reduction in mortality and heart failure-related hospitalisations as well as an improvement in LVEF in patients with heart failure and reduced ejection fraction.	This review and meta-analysis potentially affects section 5.1.5, fourth paragraph, where it is stated there was no adequately powered RCT reporting on

V. Catheter ablation for atrial fibrillation in heart failure with reduced ejection fraction: a systematic review and meta-analysis of randomized controlled trials. BMC Cardiovasc Disord. 2019:19:18.	Results: The systematic review summarises 7 RCTs (n=856). Compared with medical therapy (including use of AAD), AF catheter ablation was associated with a significant reduction in mortality (RR 0.50, 95% CI 0.34 to 0.74, p=0.0005) and heart failure-related hospitalisations (RR 0.56, 95% CI 0.44 to 0.71, p<0.0001). Furthermore, catheter ablation led to significant improvements in LVEF (WMD 7.48, 95% CI 3.71 to 11.26, p<0.0001).	mortality in catheter ablation versus medical therapy in AF. It also supports the recommendation, currently based on a single RCT, that states: "Patients with symptomatic atrial fibrillation (paroxysmal or persistent), symptomatic heart failure and left ventricular systolic dysfunction with a left ventricular ejection fraction of 25–35% should be referred to an arrhythmia specialist for consideration of ablation."
NICE (2016) Percutaneous endoscopic laser balloon pulmonary vein isolation for atrial fibrillation [IPG 563] URL: https://www.nice.org.uk/guidance/ipg563/chapter/1-Recommendations	NICE recommends: 'Current evidence on the safety of percutaneous endoscopic laser balloon pulmonary vein isolation for atrial fibrillation shows there are serious but well-recognised complications. Evidence on efficacy is adequate in quantity and quality to support the use of this procedure provided that standard arrangements are in place for clinical governance, consent and audit.'	This procedure is not mentioned in SIGN 152.

Section 5.2.2 and 5.2.3 Implantable cardioverter defibrillator therapy in patients surviving life-threatening arrhythmias

Reference	Details	How does this potentially change current recommendations?
[Health technology assessment] [INAHTA database] Health Quality Ontario. Remote monitoring of implantable cardioverter-defibrillators, cardiac resynchronization therapy and permanent pacemakers: a health technology assessment. 2018.	Conclusions: Remote monitoring of ICDs, CRT-Ds, and pacemakers plus clinic visits resulted in improved outcomes without increasing the risk of major adverse events compared with clinic visits alone. Results: Based on 15 RCTs remote monitoring plus clinic visits resulted in fewer patients with inappropriate ICD shocks within 12 to 37 months of follow up (absolute risk difference −0.04, 95% CI −0.07 to −0.01), fewer total clinic visits, and a shorter time to detection and treatment of events compared with clinic visits alone. There was a similar risk of major adverse events. Based on 6 RCTs in patients with pacemakers, remote monitoring plus clinic visits reduced the arrhythmia burden, the time to detection and treatment of arrhythmias, and the number of clinic visits compared with clinic visits alone.	This is an update of a 2012 HTA that may have been identified in previous SIGN 152 updates. Remote monitoring is not currently covered in the guideline, but would likely fit in these sections. This HTA may be supportive of a recommendation, however the absolute difference is very small.

Section 5.2.7 Ventricular Arrhythmias: Catheter ablation for recurrent ventricular arrhythmia/ electrical storm

Reference	Details	How does this potentially change current recommendations?
Dynamed. Ventricular arrhythmias (2021)	Dynamed states that: 'catheter ablation may reduce VT recurrence (appropriate ICD shocks and therapies) and electrical storm but may not reduce mortality compared to medical therapy in patients with VT and structural heart disease'.	The clinical experts should decide whether this changes the existing recommendation:

References the following new systematic review/meta-analysis: Anderson RD *et al.* Catheter ablation versus medical therapy for treatment of ventricular tachycardia associated with structural heart disease: Systematic review and meta-analysis of randomized controlled trials and comparison with observational studies. Heart Rhythm. 2019 Oct;16(10):1484-1491	References the review by Anderson *et al* which concludes: 'Meta-analysis of RCT data shows that CA is superior to medical therapy for predominantly postinfarct, scar-related VT in terms of VT recurrence and electrical VT storm, with no reduction in mortality. Real-world observational studies also demonstrate significant reduction in VT recurrence and mortality, despite a sicker cohort, demonstrating replicability and translation of RCT data in the real world.'	'Catheter ablation should be considered in patients with electrical storm, where maximal medical therapy and appropriate ICD reprogramming have failed to control the arrhythmia'
Dynamed. Ventricular arrhythmias (2021) *References the following new systematic review/meta-analysis:* Martinez BK *et al*. Systematic review and meta-analysis of catheter ablation of ventricular tachycardia in ischemic heart disease. Heart Rhythm. 2020 Jan;17(1):e206-e219.	The Dynamed summary states: 'catheter ablation may reduce cardiac hospitalization, appropriate ICD therapies, appropriate ICD shocks, and VT storm, but may not reduce mortality, in patients with ischemic heart disease and ICD ' References the review by Martinez *et al*: 'In this systematic review and meta-analysis of RCTs, CA was associated with a significant reduction in the odds of appropriate ICD therapies, appropriate ICD shocks, VT storm, and cardiac hospitalizations in patients with IHD.'	The clinical experts should decide whether this changes the existing recommendation: 'Catheter ablation should be considered in patients with electrical storm, where maximal medical therapy and appropriate ICD reprogramming have failed to control the arrhythmia'

2.3 Potentially important new evidence

Reference	Details	How does this potentially change current recommendations?
BMJ Best Practice (2021) Chronic atrial fibrillation. URL: Chronic atrial fibrillation - Symptoms, diagnosis and treatment | BMJ Best Practice (oclc.org) The section on LAAO includes reference to *LAAOS III (2021) and PINNACLE FLX (2021). The LAAOS trial was flagged by Prof. Connelly*	LAAO may be considered as an alternative for stroke prevention when there are absolute contraindications to use of anticoagulants, or the risk of bleeding outweighs the benefits. Devices such as the WATCHMAN and the Amplatzer Cardiac Plug device may be implanted percutaneously via transeptal catheterisation. The WATCHMAN device has a polyethylene membrane that covers a self-expanding nitinol cage with barbs to anchor the device in the left atrial appendage (LAA). In the PROTECT AF trial, the primary efficacy event rate (a composite endpoint of stroke, cardiovascular death, and systemic embolism) of the WATCHMAN device was considered non-inferior to that of warfarin. There was a higher rate of adverse safety events in the intervention group than in the control group, due mainly to peri-procedural complications. The Amplatzer Cardiac Plug consists of a small proximal disc, a central polyester patch, and a larger distal disc with hooks to anchor the device in the LAA. It does not require anticoagulation and a European trial found a 96% success rate for deployment/implantation but with a 7% incidence of serious complications. Another non-pharmacological approach to isolate and occlude LAA is to tie off the LAA using the LARIAT device, which is an epicardial snare.	There is currently no mention of LAAO in SIGN 152. In 2019, SHTG published: Left atrial appendage occlusion (LAAO) in patients with atrial fibrillation who have contraindications to oral anticoagulation SHTG advice states: Left atrial appendage occlusion (LAAO) may be offered to patients with non-valvular atrial fibrillation deemed to be at high risk of ischaemic stroke, who have absolute contraindications to oral anticoagulation with warfarin and direct oral anticoagulants. Prior to undergoing the LAAO procedure, an individual patient risk assessment must be carried out by a multidisciplinary team. The potential future benefits of LAAO, the risks associated with the procedure, and the need for long-term antiplatelet therapy,

	The WATCHMAN FLX device is a next-generation LAA closure device that has a greater number of struts and dual-row J-shaped anchors to maximise device stability. A prospective, non-randomised, multi-centre study (PINNACLE-FLX) found the WATCHMAN FLX to be associated with a low incidence of adverse events and a high incidence of anatomic closure. The safety and efficacy of concomitant surgical LAAO in patients with AF undergoing cardiac surgery for another indication was evaluated in a multi-centre, randomised trial (Left Atrial Appendage Occlusion Study [LAAOS III]). Participants had a mean age of 71 years and a mean CHA2DS2-VASc score of 4.2 and most continued to receive ongoing anti-thrombotic therapy. The risk of ischaemic stroke or systemic embolism was lower in the group who had concomitant LAAO performed during the surgery than the group who didn't at a mean follow-up of 3.8 years.	should be discussed with each patient prior to making a treatment decision. LAAO procedure volume per centre should be maximised to support optimal patient outcomes and ensure clinical experience is achieved and retained.
Dynamed (2021) Atrial fibrillation. *References the following trial:* Osmancik P *et al.* PRAGUE-17 Trial Investigators. Left Atrial Appendage Closure Versus Direct Oral Anticoagulants in High-Risk Patients With Atrial Fibrillation. J	LAA closure and DOAC therapy may be associated with similar risk of composite of cardiovascular and treatment-related adverse events in adults with non-valvular atrial fibrillation at moderate-to-high risk for stroke.	Additional evidence to support the addition of a recommendation around LAAO to SIGN 152.

Am Coll Cardiol. 2020 Jun 30;75(25):3122-3135.		
[Health technology assessment – systematic review, network meta-analysis, economic evaluation] [INAHTA database] Health Quality Ontario. Left atrial appendage closure device with delivery system: a health technology assessment. 2017.	Conclusions: Left atrial appendage closure (LAAC) is as effective as novel oral anticoagulants in preventing stroke in people with non-valvular atrial fibrillation. However, our results indicate that the LAAC device is cost-effective only in patients with contraindications to oral anticoagulants. Results: 7 RCTs met the inclusion criteria for indirect comparison. Five studies assessed the effectiveness of novel oral anticoagulants versus warfarin, and two studies compared the LAAC device with warfarin. No studies were identified that compared the LAAC device with aspirin in patients in whom oral anticoagulants were contraindicated. The LAAC device was comparable to novel oral anticoagulants in reducing stroke (OR 0.85, 95% CrI 0.63 to 1.05). The reduction in the risk of all-cause mortality was comparable between the LAAC device and novel oral anticoagulants (OR 0.71, 95% CrI 0.49 to 1.22). The LAAC device was found to be superior to novel oral anticoagulants in preventing hemorrhagic stroke (OR 0.45, 95% CrI 0.29 to 0.79), whereas novel oral anticoagulants were found to be superior to the LAAC device in preventing ischemic stroke (OR 0.67, 95% CrI 0.24 to 1.64).	This HTA may support addition of a recommendation on LAAO. However, since there are several more recent trials identified by the group chair and literature searches, the HTA may be too old to be useful in comparison. It does however contain an assessment of cost-effectiveness that is likely missing from RCTs.

	Results from the economic evaluation indicate that the LAAC device is cost-effective compared with aspirin in patients with contraindications to oral anticoagulants. In patients without contraindications to oral anticoagulants, we found that the LAAC device is not cost-effective compared with novel oral anticoagulants.	
Dynamed (2021) Atrial flutter *References the following trial:* Vinson DR, Lugovskaya N, Warton EM, et al. Pharm CAFÉ Investigators of the CREST Network. Ibutilide Effectiveness and Safety in the Cardioversion of Atrial Fibrillation and Flutter in the Community Emergency Department. Ann Emerg Med. 2018 Jan;71(1):96-108.e2.	Based on this small retrospective cohort (n=361), the Dynamed summary states: 'ibutilide IV reported to restore sinus rhythm in many patients presenting to emergency department with atrial flutter'	No equivalent recommendation in SIGN 152
[Medical technology guidance] NICE. Zio XT for detecting cardiac arrhythmias (MTG 52). 2020.	1.1 Zio XT is recommended as an option for people with suspected cardiac arrhythmias who would benefit from ambulatory electrocardiogram (ECG) monitoring for longer than 24 hours only if NHS organisations collect information on: - resource use associated with use of Zio XT	No equivalent recommendation in SIGN 152.

	- longer-term clinical consequences for people who have monitoring with Zio XT (such as incidences of further stroke, transient ischaemic attack and other thromboembolisms, arrhythmia-related hospitalisations, mortality, uptake of anticoagulants or other changes in medication related to the monitoring result). 1.2 Evidence shows that Zio XT is convenient and easy to wear, with an improved diagnostic yield (a measure of how many people with cardiac arrhythmia are diagnosed) compared with standard 24-hour Holter monitoring. The technology is likely to be cost neutral or cost saving compared with 24-hour Holter monitoring, but more evidence is needed. 1.3 NHS organisations using Zio XT should make sure that the service complies with general data protection regulations (GDPR), and that informed consent covers how a person's data will be used.	
[Diagnostic guidance] NICE. Implantable cardiac monitors to detect atrial fibrillation after cryptogenic stroke (DG41). 2020.	1.1 Reveal LINQ is recommended as an option to help to detect atrial fibrillation after cryptogenic stroke, including transient ischaemic attacks (TIA), only if: - non-invasive electrocardiogram (ECG) monitoring has been done and - a cardiac arrhythmic cause of stroke is still suspected.	No equivalent recommendation in SIGN 152.

	1.2 Clinicians should consider if disabled people may need support from a carer to help set up the MyCareLink Patient Monitor, to ensure data from Reveal LINQ are transmitted for review. 1.3 There is not enough evidence to recommend the routine adoption of BioMonitor 2-AF (or its successor device BIOMONITOR III) or Confirm Rx to help to detect atrial fibrillation after cryptogenic stroke. Further research is recommended to assess the diagnostic yield (a measure of how many people with atrial fibrillation are diagnosed) of these devices for atrial fibrillation when used in people who have had a cryptogenic stroke.	
[Diagnostic guidance] NICE. Lead-I ECG devices for detecting symptomatic atrial fibrillation using single time point testing in primary care (DG35). 2019.	1.1 There is not enough evidence to recommend the routine adoption of lead-I electrocardiogram (ECG) devices (imPulse, Kardia Mobile, MyDiagnostick and Zenicor-ECG) to detect atrial fibrillation when used for single time point testing in primary care for people with signs or symptoms of the condition and an irregular pulse. Further research is recommended to show how using lead-I ECG devices in this way affects: - the number of people with atrial fibrillation detected, compared with current practice and - primary and secondary care services, particularly how ECGs generated by the devices would be interpreted in practice, including staff time	No equivalent recommendation in SIGN 152.

	needed to interpret the ECG traces and associated costs. 1.2 Centres currently using these devices for this indication are encouraged to take part in research and data collection.	
[Systematic review and economic evaluation] Duarte R, Stainthorpe A, Greenhalgh J, Richardson M, Nevitt S, Mahon J, et al. Lead-I ECG for detecting atrial fibrillation in patients with an irregular pulse using single time point testing: a systematic review and economic evaluation. NIHR HTA. 2020.	Conclusions: Single time point lead-I ECG devices for the detection of AF in people with signs or symptoms of AF and an irregular pulse appear to be a cost-effective use of NHS resources compared with manual pulse palpitation followed by a 12-lead ECG in primary or secondary care, given the assumptions used in the base-case model. Results: The diagnostic accuracy and clinical impact of single time point lead-I ECG devices are derived from an asymptomatic population (used as a proxy for people with signs or symptoms of AF). The summary sensitivity of lead-I ECG devices was 93.9% (95% CI 86.2% to 97.4%) and summary specificity was 96.5% (95% CI 90.4% to 98.8%). The results of the pairwise analysis in the economic model show that all lead-I ECG devices generated ICERs per QALY gained below the £20,000–30,000 threshold. Kardia Mobile (AliveCor Ltd, Mountain View, CA, USA) is the most cost-effective option in a full incremental analysis.	There is no equivalent recommendation in SIGN 152. The main results in this publication are the results of a UK-based economic model.

[Cochrane systematic review] Pellicori P, Doolub G, Wong CM, Lee KS, Mangion K, Ahmad M, et al. COVID-19 and its cardiovascular effects: a systematic review of prevalence studies. Cochrane Database of Systematic Reviews 2021, Issue 3.	Conclusions: Cardiometabolic comorbidities are common in people who are hospitalised with a COVID-19 infection, and cardiovascular complications are frequent. Results: 220 included studies. Most of the studies originated from China (47.7%) or the USA (20.9%); 9.5% were from Italy. A large proportion of the studies were retrospective (89.5%), but three (1.4%) were RCTs and 20 (9.1%) were prospective. Hypertension (189 studies, n=174,414, weighted mean prevalence (WMP) 36.1%), diabetes (197 studies, n=569,188, WMP 22.1%) and ischaemic heart disease (94 studies, n=100,765, WMP 10.5%) are highly prevalent in people hospitalised with COVID-19, and are associated with an increased risk of death. In those admitted to hospital, biomarkers of cardiac stress or injury are often abnormal, and the incidence of a wide range of cardiovascular complications is substantial, particularly arrhythmias (22 studies, n=13,115, weighted mean incidence (WMI) 9.3%), heart failure (20 studies, n=29,317, WMI 6.8%) and thrombotic complications (16 studies, n=7,700, WMI 7.4%).	There is no equivalent recommendation in SIGN 152 (for obvious reasons). It is included here as a potentially time-sensitive recommendation may be possible.

Consultation feedback

Former members of the SIGN 152 guideline development group were invited to comment on the report and the proposed areas for update.

Reviewer	Comments
Dr Deborah Tinson, Clinical Psychologist	I have been interested to read of one or two new papers on psychological treatment in this area, in particular that by Berg S.K et al 2020 (Eur J Prev Cardiol 27(3):258-268). This paper looks at the psychological treatment of patients at a higher level of need in the psychological stepped care model than those which are mentioned in the current guideline. Instead of being general sample of ICD patients, these are selected due to having a clinical level of anxiety. Despite this increased level of severity, the supervised CBT delivered by trained nurses was effective in improving mood. Hopefully, this paper can be included in the next full guideline.
Dr Rachel Myles, Clinical Senior Lecturer & Honorary Consultant Cardiologist	During the last update, my recollection is that we were unable to expand or refine the scope of the document to reflect clinical practice and I am not sure it is useful in its current form. The main issue being that very little of the evidence we are considering updating actually relates specifically to cardiac arrhythmias in coronary heart disease. In my view this is not a particularly useful categorisation clinically, and many areas of the evidence base will look at arrhythmia management by arrhythmia rather than by arrhythmias in a specific disease setting. I think this means the overall utility of the document is limited and I would favour a set of arrhythmia guidelines which cover evidence-based cardiac arrhythmia management as it presents to clinicians in Scotland, rather than with this rather narrow and artificial focus. This is quite a big task and I think would need to be balanced against what it would add to currently available clinical practice guidelines. So, for the scoping report my vote would be for: substantial work on the guideline is required and a new topic proposal or withdrawal should be sought.

Concluding remarks (Dr Moray Nairn, Programme Manager for SIGN 152)

Comments from a guideline development group member suggest that the structure of the guideline (which was inherited from SIGN CVD guidelines first published 2007) may no longer optimally reflect current practice.

The literature search has identified a number of areas where there is evidence or recommendations in other guidelines (eg the European Heart Journal guideline for the diagnosis and management of atrial fibrillation, and the European Society of Cardiology guideline on cardiac pacing and cardiac resynchronization therapy) which map to gaps in the SIGN guideline. These include diagnosis of atrial fibrillation, laser balloon ablation, antiarrhythmic drug treatment after left atrial ablation, left atrial appendage occlusion in patients who have contraindications to oral anticoagulation, use of statins in people having cardiothoracic surgery solely to prevent postoperative atrial fibrillation and consideration of either a rhythm-control or rate-control strategy for the initial treatment of new-onset postoperative atrial fibrillation after cardiothoracic surgery.

There is new evidence on the topics of pharmacological therapies for rate and rhythm control of atrial fibrillation and a range of specific medical technologies which may shift the balance of benefits and harms in selected patient groups.

This suggests that **substantial work on the guideline is required and a new topic proposal should be sought**

Decision

On 19 May 2022 the Work Programme Committee recommended:

This guideline is in need of review and has been accepted onto the SIGN guideline programme.

Evidence sources

Resource	Results
Dynamed	Ventricular arrhythmias. 2021. 20 SEP 2019: catheter ablation may reduce ventricular tachycardia recurrence (appropriate ICD shocks and therapies) and electrical storm but not mortality compared to medical therapy in patients with ventricular tachycardia and structural heart disease (Heart Rhythm 2019) 20 SEP 2019: catheter ablation may reduce cardiac hospitalization, appropriate ICD therapies, appropriate ICD shocks, and ventricular tachycardia storm, but may not reduce mortality, in patients with ischemic heart disease and ICD (Heart Rhythm 2019 Apr 27) Atrial flutter. 2021. 14 OCT 2019: ibutilide IV reported to restore sinus rhythm in many patients presenting to emergency department with atrial flutter (Ann Emerg Med 2018 Jan) Atrial fibrillation. 2021. Updated 17 Jun 2021: LAA closure and DOAC therapy may be associated with similar risk of composite of cardiovascular and treatment-related adverse events in adults with nonvalvular atrial fibrillation at moderate-to-high risk for stroke (J Am Coll Cardiol 2020 Jun 30)
BMJ Best Practice	BMJ Best Practice (2021) Chronic atrial fibrillation. URL: Chronic atrial fibrillation - Symptoms, diagnosis and treatment | BMJ Best Practice (oclc.org) BMJ Best Practice (2021) New-onset atrial fibrillation. URL: https://bestpractice.bmj.com/topics/en-gb/3000087 *[No new studies that were relevant to the current guideline]*

	BMJ Best Practice (2020) Non-sustained ventricular tachycardias. URL: Non-sustained ventricular tachycardias - Symptoms, diagnosis and treatment | BMJ Best Practice *[Not included as seems to be time-limited non-ischaemic cardiac arrhythmia]* BMJ Best Practice (2021) Assessment of tachycardia. URL: Assessment of tachycardia - Differential diagnosis of symptoms | BMJ Best Practice *[Not included as no current section on assessment of tachycardia or other arrhythmias]* BMJ Best Practice (2021) Atrial flutter. URL: Atrial flutter - Symptoms, diagnosis and treatment | BMJ Best Practice BMJ Best Practice (2019) Sustained ventricular tachycardia. URL: Sustained ventricular tachycardias - Symptoms, diagnosis and treatment | BMJ Best Practice *[Not included in summary as nothing relevant found in references]*
Guidelines and guidance	
Previous HIS projects/advice/guidance relating to this topic	Scottish Health Technologies Group (2021) Detection of paroxysmal atrial fibrillation in patients with newly diagnosed ischaemic stroke. URL: https://shtg.scot/our-advice/detection-of-paroxysmal-atrial-fibrillation-in-patients-with-newly-diagnosed-ischaemic-stroke/ Scottish Health Technologies Group (2019) Left atrial appendage occlusion (LAAO) in patients with atrial fibrillation who have contraindications to oral anticoagulation. URL: https://shtg.scot/our-advice/left-atrial-appendage-occlusion-laao-in-patients-with-atrial-fibrillation-who-have-contraindications-to-oral-anticoagulation/ Scottish Medicines Consortium (2019) Flecainide 200mg caps (Tambocor XL). URL: flecainide 200mg caps (Tambocor XL) (scottishmedicines.org.uk): *In December 2019, flecainide 200mg prolonged release capsules (Tambocor XL) were discontinued.*

NICE	NICE (2020) Zio XT for detecting cardiac arrhythmias (MTG 52). URL: 1 Recommendations | Zio XT for detecting cardiac arrhythmias | Guidance | NICE NICE (2021) Atrial fibrillation: diagnosis and management (NG196). URL: https://www.nice.org.uk/guidance/ng196 NICE (2020) Implantable cardiac monitors to detect atrial fibrillation after cryptogenic stroke (DG41). URL: https://www.nice.org.uk/guidance/DG41 NICE (2019) Lead-I ECG devices for detecting symptomatic atrial fibrillation using single time point testing in primary care (DG35). URL: https://www.nice.org.uk/guidance/dg35 NICE (2017) Subcutaneous implantable cardioverter defibrillator insertion for preventing sudden cardiac death (IPG603). URL: https://www.nice.org.uk/guidance/ipg603 (not included above – this does not seem to be at odds with any recommendations currently in SIGN 152) NICE (2018) Leadless cardiac pacemaker implantation for bradyarrhythmias [IPG 626] URL: 1 Recommendations | Leadless cardiac pacemaker implantation for bradyarrhythmias | Guidance | NICE (not included above – is the outwith the remit of SIGN 152?) NICE (2016) Percutaneous endoscopic laser balloon pulmonary vein isolation for atrial fibrillation [IPG 563] URL: https://www.nice.org.uk/guidance/ipg563/chapter/1-Recommendations **The following MedTech Innovation Briefings have been published, but are not included in the scope given that they do not include recommendations:** *Carnation Ambulatory Monitor for ambulatory detection of cardiac arrhythmias https://www.nice.org.uk/advice/mib276* *KODEX-EPD for cardiac imaging during ablation of arrhythmias https://www.nice.org.uk/advice/mib260*

	AcQMap for mapping the heart atria to target ablation treatment for arrhythmias *https://www.nice.org.uk/advice/mib246* *KardiaMobile for the ambulatory detection of atrial fibrillation https://www.nice.org.uk/advice/mib232*
HTW	Nil
HTA database	Duarte R, Stainthorpe A, Greenhalgh J, Richardson M, Nevitt S, Mahon J et al (2020) Lead-I ECG for detecting atrial fibrillation in patients with an irregular pulse using single time point testing: a systematic review and economic evaluation. National Institute for Health Research. URL: Lead-I ECG for detecting atrial fibrillation in patients with an irregular pulse using single time point testing: a systematic review and economic evaluation (nihr.ac.uk) Edwards SJ, Wakefield V, Jhita T, Kew K, Cain P, Marceniuk G (2020) Implantable cardiac monitors to detect atrial fibrillation after cryptogenic stroke: a systematic review and economic evaluation. National Institute for Health Research. URL: Implantable cardiac monitors to detect atrial fibrillation after cryptogenic stroke: a systematic review and economic evaluation (nihr.ac.uk) *[Not included in summary as seems to be no interest in cardiac monitoring to find AF in patients post-stroke – may be within remit of other guidelines]* Health Quality Ontario. Remote monitoring of implantable cardioverter-defibrillators, cardiac resynchronization therapy and permanent pacemakers: a health technology assessment. (2018) URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6235077/ AIHTA. Leadless pacemaker for right ventricle pacing (2020 update) URL: https://database.inahta.org/article/19051 *[Not included in summary – only English summary of HTA available]*

	Health Quality Ontario. Left atrial appendage closure device with delivery system: a health technology assessment. 2017. URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5515321/
Additional searching (if required)	
Cochrane library	Valembois L, Audureau E, Takeda A, Jarzebowski W, Belmin J, Lafuente-Lafuente C. Antiarrhythmics for maintaining sinus rhythm after cardioversion of atrial fibrillation. Cochrane Database of Systematic Reviews 2019, Issue 9. URL: Antiarrhythmics for maintaining sinus rhythm after cardioversion of atrial fibrillation - Valembois, L - 2019 | Cochrane Library Bruins Slot KMH, Berge E. Factor Xa inhibitors versus vitamin K antagonists for preventing cerebral or systemic embolism in patients with atrial fibrillation. Cochrane Database of Systematic Reviews 2018, Issue 3 URL: Factor Xa inhibitors versus vitamin K antagonists for preventing cerebral or systemic embolism in patients with atrial fibrillation - Bruins Slot, KMH - 2018 | Cochrane Library *[Not included in summary as factor Xa inhibitors and vitamin K antagonists not mentioned in guideline and this seems to focus on embolism]* Risom SS, Zwisler AD, Johansen PP, Sibilitz KL, Lindschou J, Gluud C, et al. Exercise-based cardiac rehabilitation for adults with atrial fibrillation. Cochrane Database of Systematic Reviews 2017, Issue 2. URL: Exercise-based cardiac rehabilitation for adults with atrial fibrillation - Risom, SS - 2017 | Cochrane Library *[Not included in summary because there is a separate guideline on cardia rehabilitation that covers this]* Pellicori P, Doolub G, Wong CM, Lee KS, Mangion K, Ahmad M, et al. COVID-19 and its cardiovascular effects: a systematic review of prevalence studies. Cochrane Database of Systematic Reviews 2021, Issue 3. URL: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD013879/full *[Of interest for current pandemic context? Included under new evidence]* Blessberger H, Lewis SR, Pritchard MW, Fawcett LJ, Domanovits H, Schlager O, et al. Perioperative beta-blockers for preventing surgery-related mortality and morbidity in adults undergoing cardiac surgery. Cochrane Database of Systematic Reviews 2019, Issue 9. URL: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD013435/full

	[Not included in summary as focus seems to be on management rather than prevention?] Faddy SC, Jenning PA. Biphasic versus monophasic waveforms for transthoracic defibrillation in out-of-hospital cardiac arrest. Cochrane Database of Systematic Reviews 2016, issue 2. URL: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD006762.pub2/full
Other	https://www.resus.org.uk/library/2021-resuscitation-guidelines/executive-summary-main-changes-2015-guidelines *[Cited in previous guidelines and now updated – not included in summary]*
	2017 AHA/ACC/HRS Guideline for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death: Executive Summary (2017) https://www.ahajournals.org/doi/10.1161/CIR.0000000000000548?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed *[Not included in summary – seems to be related to conditions excluded from SIGN 152]*