**Haematology audit template**

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| **Date of completion**  | (To be inserted when completed) |
| **Name of lead author/participants** | (To be inserted) |
| **Specialty** | Haematology |
| **Title** | **An audit of compliance with the British Society for Haematology good practice paper on the management of cardiovascular complications of Bruton tyrosine kinase inhibitors** |
| **Background** | The British Society for Haematology (BSH) has published a good practice paper on the management of cardiovascular complications of Bruton tyrosine kinase inhibitors (BTKi). This audit will review compliance with some of the level 1 recommendations made. |
| **Aim & objectives** | To review whether patients being treated with a BTKi for chronic lymphocytic leukaemia (CLL) are being: 1. correctly monitored for cardiovascular complications
2. appropriately managed should they develop such complications.
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| **Standards & criteria** | 100% or, if not achieved, there is documentation in the case notes that explains the variance.1. All patients should have their blood pressure (BP) measured at every clinic visit. Patients with systolic BP >140 mmHg or diastolic BP >90 mmHg should be offered ambulatory blood pressure monitoring (ABPM) or home blood pressure monitoring (HBPM).
2. Patients aged <80 years with ABPM/HBPM >135/85 mmHg, especially those with target organ damage or diabetes, and patients aged >80 years with ABPM/HBPM >145/85 mmHg, should be considered for commencement of antihypertensive treatment.
3. Angiotensin-converting enzyme inhibitors (ACEi) or angiotensin II receptor-blockers (ARB) are recommended as first-line treatment of BTKi-related hypertension; when combining antihypertensives, medications that inhibit CYP3A4 should preferably be avoided.
4. Patients with asymptomatic severe hypertension (clinic BP of 180/120 mmHg) should be assessed for target organ damage and commenced on an antihypertensive immediately, with the BTKi withheld until BP is adequately controlled.
5. Baseline and serial (3–6 monthly) electrocardiograms (ECGs) should be performed during the first 12 months of therapy.
6. A baseline transthoracic echocardiogram is recommended for patients with pre-existing atrial fibrillation (AF), heart failure, diabetes, coronary artery disease and/or hypertension.
7. Patients with new AF during BTKi treatment should be referred promptly to cardiology for joint decision-making regarding the need for anticoagulation and pharmacological/non-pharmacological treatment of symptoms.
8. Patients with haemodynamically stable AF should first undergo a rate control strategy with the use of a beta blocker licensed for heart failure (bisoprolol, carvedilol or nebivolol) recommended.
9. Cessation of the BTKi is strongly recommended in patients who develop significant worsening of heart failure until they are stabilised and a specialist cardio-oncology opinion can guide cautious reintroduction with appropriate surveillance.
10. The risks of ventricular arrhythmia (VA) and sudden cardiac death should be included in routine patient consent for treatment with BTKi.
11. Patients presenting with symptoms of syncope, dizziness or palpitations should undergo further investigations with ECG, and be referred to cardiology for echocardiography and cardiac rhythm monitoring.
12. BTKi therapy should be discontinued in patients with idiopathic VA, with an urgent cardiology referral made to exclude underlying cardiac disease.
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| **Method** | 1. **Sample selection**
* All patients being treated with a BTKi for CLL, up to a maximum of 20 consecutive patients.
1. **Data to be collected on proforma (see below).**
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| **Results** | (To be completed by the author)The results of this audit show the following compliance with the standards.

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| **Investigation** | **% compliance** |
| All patients had their BP measured at every clinic visit. Those with systolic BP >140 mmHg or diastolic BP >90 mmHg were offered ABPM or HBPM |  |
| Patients aged <80 years with ABPM/HBPM >135/85 mmHg, especially those with target organ damage or diabetes, and those aged >80 years with ABPM/HBPM >145/85 mmHg were commenced on, or at least considered for, antihypertensive treatment |  |
| Patients with BTKi-related hypertension were given an ACEi or ARB as first-line treatment and medications that inhibit CYP3A4 were avoided  |  |
| Any patients with asymptomatic severe hypertension (clinic BP of 180/120 mmHg) were assessed for target organ damage and commenced on an antihypertensive immediately. The BTKi was withheld until the BP was adequately controlled |  |
| Baseline and serial (3–6 monthly) ECGs were performed during the first 12 months of therapy |  |
| Patients with pre-existing AF, heart failure, diabetes, coronary artery disease and/or hypertension underwent a baseline transthoracic echocardiogram  |  |
| Patients with new AF during BTKi treatment were referred promptly to cardiology for joint decision-making regarding the need for anticoagulation and pharmacological/non-pharmacological treatment of symptoms |  |
| Patients with haemodynamically stable AF underwent an initial rate control strategy using a beta blocker licensed for heart failure (i.e. bisoprolol, carvedilol or nebivolol) |  |
| Patients who developed significant worsening of heart failure had their BTKi stopped until they were stabilised and a specialist cardio-oncology opinion was able to guide cautious reintroduction with appropriate surveillance |  |
| Patients were advised of the risks of VA and sudden cardiac death during the consent process for BTKi treatment  |  |
| Patients presenting with symptoms of syncope, dizziness or palpitations underwent further investigations with an ECG, and were referred to cardiology for echocardiography and cardiac rhythm monitoring |  |
| Patients with idiopathic VA had their BTKi therapy discontinued and an urgent referral made to cardiology to exclude underlying cardiac disease |  |

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| **Conclusion** | (To be completed by the author) |
| **Recommendations for improvement** | Present the result with recommendations, actions, and responsibilities for action and a timescale for implementation. Assign a person(s) responsible to do the work within a time frame.**Some suggestions:*** highlight areas of practice that are different
* present findings.
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| **Action plan** | (To be completed by the author − attached action plan proforma) |
| **Re-audit date** | (To be completed by the author) |
| **Reference** | Tang CPS, Lip GYH, McCormackT, LyonAR, HillmenP, Iyengar S *et al*. Management of cardiovascular complications of bruton tyrosine kinase inhibitors. A British Society for Haematology Good Practice Paper. *Br J Haematol* 2022;196:70–78. <https://onlinelibrary.wiley.com/doi/10.1111/bjh.17788> |

**Data collection proforma for patients being treated with a BTKi for CLL**

**Audit reviewing practice**

Patient name:

Hospital number:

Date of birth:

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| Standard | **1****Yes**  | **2****No** | **3** If box 1 not ticked, was there documentation to explain the variance?**Yes/No** plus free-text comment | **4** Compliant with guideline if box 1 ticked or an appropriate explanation from column 3. **Yes/No**(Record if standard not applicable) |
| **1**  Patients had their BP measured at every clinic visit and were offered ABPM or HBOM if their systolic BP was >140 mmHg or diastolic BP >90 mmHg  |  |  |  |  |
| **2**  Patients aged <80 years with ABPM/HBPM >135/85 mmHg or >80 years with ABPM/HBPM >145/85 mmHg were commenced on, or at least considered for, antihypertensive treatment |  |  |  |  |
| **3**  Patients with BTKi-related hypertension were given an ACEi or ARB as first-line treatment and medications that inhibit CYP3A4 were avoided |  |  |  |  |
| **4**  Patients with asymptomatic severe hypertension (clinic BP of 180/120 mmHg) were assessed for target organ damage and commenced on an antihypertensive immediately, and the BTKi was withheld until the BP was adequately controlled |  |  |  |  |
| **5**  Patients underwent baseline and serial (3–6 monthly) ECGs during the first 12 months of therapy |  |  |  |  |
| **6**  Patients with pre-existing AF, heart failure, diabetes, coronary artery disease and/or hypertension underwent a baseline transthoracic echocardiogram |  |  |  |  |
| **7**Patients with new AF during BTKi treatment were referred promptly to cardiology for joint decision-making regarding the need for anticoagulation and pharmacological/non-pharmacological treatment of symptoms |  |  |  |  |
| **8**  Patients with haemodynamically stable AF were initially treated using a beta blocker licensed for heart failure (bisoprolol, carvedilol or nebivolol) to control rate |  |  |  |  |
| **9**Patients who developed significant worsening of heart failure had their BTKi stopped until they were stabilised and a specialist cardio-oncology opinion was able to guide cautious reintroduction with appropriate surveillance |  |  |  |  |
| **10**  Patients were advised of the risks of VA and sudden cardiac death during the consent process for BTKi treatment |  |  |  |  |
| **11**  Patients presenting with symptoms of syncope, dizziness or palpitations underwent further investigations with an ECG, and were referred to cardiology for echocardiography and cardiac rhythm monitoring |  |  |  |  |
| **12**  Patients with idiopathic VA had their BTKi therapy discontinued and an urgent referral made to cardiology to exclude underlying cardiac disease |  |  |  |  |

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| **Audit action plan**An audit of compliance with the British Society for Haematology good practice paper on the management of cardiovascular complications of Bruton tyrosine kinase inhibitors  |
| **Audit recommendation** | **Objective** | **Action** | **Time scale** | **Barriers and constraints** | **Outcome** | **Monitoring** |
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