NHS
Herefordshire and Worcestershire
Clinical Commissioning Group

Exogen® Ultrasound Bone Healing System for Long Bone Fractures with Non-Union or Delayed Healing Commissioning Policy

April 2020

Commissioning Summary

Following a review of the evidence and consideration of the local circumstances for use, Herefordshire and Worcestershire Clinical Commissioning Group **will separately fund** (in accordance with this policy):

- use of Exogen® ultrasound bone healing system to treat long bone fractures with non-union, in accordance with defined clinical and process criteria (see Section 6)

Herefordshire and Worcestershire Clinical Commissioning Group **will not separately fund**:

- use of Exogen® ultrasound bone healing system to treat long bone fractures with delayed union
- any other indications for use of Exogen® ultrasound bone healing system

Any identified new indications for use of Exogen® ultrasound bone healing system requiring additional funding will require submission of a new technology request form for consideration by Herefordshire and Worcestershire Clinical Commissioning Policy Collaborative.

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Please contact the Communications Team: 01905 681956

Document Details:

Version:	1.0
Ratified by (name and date of Committee):	Herefordshire & Worcestershire Clinical Commissioning Groups - Joint Commissioning Committee – 25th February 2020 for use from 1st April 2020
Date issued:	1st April 2020
Internal Review Date:	Documents will be reviewed as a minimum every 3 years. However, earlier revisions to the policy may be made in light of published updates to local and national evidence of effectiveness and cost effectiveness and/or recommendations and guidelines from local, national and international clinical professional bodies. Date to Initiate Review: 1st April 2023
Lead Executive/Director:	Paul Ryan – Associate Director of Contracting & Procurement
Name of originator/author:	Fiona Bates – Specialist Medicines and Clinical Policy Adviser Helen Bryant – Head of Acute Contracts
Target audience:	Patients, GPs, Optometrists, Secondary Care and Primary Care (Community) Providers, Independent Sector Providers
Distribution:	GPs, Secondary Care & Primary Care (Community) Providers, Independent Sector Providers, CCG Internet Pages
Equality & Diversity Impact Assessment	January 2020

Key individuals involved in developing the document:

Name	Designation	Version Reviewed
Simon Gartland	Associate Director of Contracting – Worcestershire CCGs	V1.0
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Fiona Bates	Specialist Medicines and Clinical Policy Adviser	V1.0
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Circulated to the following individuals/groups for comments:

Name	Date	Version Reviewed
Policy Alignment Task & Finish Group	18th February 2020	Version 1.0
Herefordshire & Worcestershire Clinical Commissioning Groups - Joint Commissioning Committee	25th February 2020	Version 1.0

Version Control:

Version No	Type of Change	Date	Description of change
1.0	Minor	February 2020	Adoption of policies from NHS Worcestershire Clinical Commissioning Group by NHS Herefordshire Clinical Commissioning Groups, where there was no previous policy

			(V1.0 of previous document). Update includes incorporation of the NICE review of MTG12 in 2019 to 'amend the guidance and do not consultant on the review proposal'. The NICE evidence update involved: - Reference to 2 versions of the technology replaced by a single updated version - Revised cost saving estimates - No change to recommendations

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1. Definitions

1.1 **Exceptional** - refers to a person who demonstrates characteristics, which are highly unusual, uncommon or rare.

1.2 **Exceptional clinical circumstances** are clinical circumstances pertaining to a particular patient, which can properly be described as exceptional, when compared to the clinical circumstances of other patients with the same clinical condition and at the same stage of development of that condition (i.e. similar patients). A patient with **exceptional clinical circumstances** will have clinical features or characteristics which differentiate that patient from other patients in that cohort and result in that patient being likely to obtain significantly greater clinical benefit (than those other patients) from the intervention for which funding is sought.

1.3 A **Similar Patient** is a patient who is likely to be in the same or similar clinical circumstances as the requesting patient and who could reasonably be expected to benefit from the requested treatment to the same or a similar degree. The existence of more than one similar patient indicates that a decision regarding the commissioning of a **service development** or commissioning policy is required of the Commissioner.

1.4 An **individual funding request (IFR)** is a request received from a provider or a patient with explicit support from a clinician, which seeks exceptional funding for a single identified patient for a specific treatment.

1.5 An **in-year service development** is any aspect of healthcare, other than one which is the subject of a successful individual funding request, which the Commissioner agrees to fund outside of the annual commissioning round. Such unplanned investment decisions should only be made in exceptional circumstances because, unless they can be funded through disinvestment, they will have to be funded as a result of either delaying or aborting other planned developments.

2. Scope of Policy

2.1 This policy is part of a suite of locally endorsed Commissioning Policies. Copies of these Commissioning Policies are available on the following website address: This policy is part of a suite of locally endorsed Commissioning Policies. Copies of these Commissioning Policies are available on the following website address: www.herefordshireandworcestershireccg.nhs.uk

2.1 This policy applies to all patients for whom Herefordshire & Worcestershire CCG has responsibility including:

- People provided with primary medical services by GP practices which are members of the CCG and
- People usually resident in the area covered by the CCG and not provided with primary medical services by any CCG.

2.2 Where a patient's clinical presentation does not clearly meet the requirements for secondary care referral within the context of this policy, and where a GP is uncertain or concerned about the appropriate treatment/management pathway, referral for Advice & Guidance should be considered as an alternative to a referral for clinical assessment.

2.3 There may be occasions when a GP referral is made for specialist assessment which appears to meet the policy requirements, but which on specialist clinical examination either does not meet the clinical criteria for surgery or is not considered clinically suitable for surgery. Such patients should be discharged without surgery.

2.4 For patients who do not fall within the eligibility criteria set out in the policy but where there is demonstrable evidence that the patient has exceptional clinical circumstances, an Individual Funding Request may be submitted for consideration. The referring clinician should consult the Commissioner's "Operational Policy for Individual Funding Requests" document for further guidance on this process.

2.5 For a definition of the term "exceptional clinical circumstances", please refer to the Definitions section of this document.

2.6 This policy relates to use of Exogen® ultrasound bone healing system when used for management of long bone fractures in an out-patient setting.

2.7 The Exogen® ultrasound bone healing system delivers low-intensity pulsed ultrasound waves with the aim of stimulating bone healing. It is thought that healing is promoted by stimulating the production of growth factors and proteins that increase the removal of old bone, increase the production of new bone and increase the rate at which fibrous matrix at a fracture site is converted to mineralised bone.

2.8 Long bone fractures are suitable for treatment if the fracture is stable and well aligned. Exogen® is not indicated for use in fractures of the skull or vertebrae or in children or adolescents because of their skeletal immaturity.

2.9 The Exogen® system is a single hand-held device with 2 treatment options: Exogen® 150 and Exogen® 250. These are equivalent to the former versions Exogen® Express and Exogen® 4000+ respectively. The device has a visual treatment-tracking calendar and treatment history log aimed at improving compliance. Exogen® controls the number of treatments performed using an SD card. The device operates on a low lithium battery and has a battery door and charger. The device also has a smartphone app, Exogen® Connects, which enables adherence by providing information such as treatment

reminders, information on fracture healing and videos on how to use Exogen®. The phone app has not been assessed as part of the evaluation.

2.10 The Exogen® device consists of a main operating unit with a permanently connected transducer and a separate fixture strap. The strap is placed around the fractured bone, coupling gel is applied to the transducer head (to aid conduction of ultrasound) and the transducer is secured directly over the fracture site by a fixture on the strap. The ultrasound signal emitted by the device is derived from a combination of defined electrical signal parameters and the proprietary transducer design, which generate an acoustic wave pattern specific to Exogen®. If the patient's limb is immobilised in a cast then a hole is cut in the cast to allow access of the transducer to the skin. The device is programmed to deliver ultrasound in 20 minute sessions and these are self-administered by the patient each day. It is intended to be used in the patient's home.

3. Background

3.1 The NHS Constitution, which details the principles and values that guide the NHS, has been applied in the agreement of this policy.

3.2 NHS Herefordshire & Worcestershire Clinical Commissioning Group consider all lives of all patients whom they serve to be of equal value and, in making decisions about funding treatment for patients, will seek not to discriminate on the grounds of sex, age, sexual orientation, ethnicity, educational level, employment, marital status, religion or disability except where a difference in the treatment options made available to patients is directly related a particular patient's clinical condition or is related to the anticipated benefits to be derived from a proposed form of treatment.

3.3 Following immediate management of a presenting fracture through casting, traction or surgical intervention, patients receive regular follow-up to determine progression of healing. In children and adolescents healing rates in the order of 99% are usual whilst in adults this is around 80% depending on the bone involved.

3.4 Healing of fractures varies according to the nature of the fracture and affected bone, host factors including age, co-morbidities and lifestyle factors and other issues such as surgical aspects and infection. The definition of non-union therefore can vary according to these parameters. It is usual practice to consider non-union from around 6 months following fracture; at this stage re-intervention is considered.

3.5 Exogen® has been available since 1997. In January 2013, the National Institute for Health and Clinical Excellence (NICE) completed a review of the technology and the associated evidence for use. This included 7 studies (3 non-union, 1 delayed union and 3 both delayed and non-union). The outcomes of this review were published as Medical Technology Guidance 12.

3.6 In October 2019 NICE updated the MTG12 guidance to reflect 2019 costs. An updated review of the evidence provided results on both delayed and non-union fractures, with most of the evidence on non-union fractures.

3.7 The Exogen® express and Exogen® 4000+ devices assessed in MTG12 are no longer sold in the UK. Both models have been replaced by a single hand-held device, Exogen® launched in 2013. The new device has the same mechanism of action and ultrasound signal as the previous devices

4. Relevant National Guidance and Facts

4.1 NICE published Medical Technology Guidance (MTG12) for Exogen® in January 2013. NICE updated this guidance in October 2019 to reflect 2019 costs. The guidance demonstrates that the ultrasound technique is cost-saving over traditional surgery when used for the treatment of long bone fractures with non-union. The NICE recommendations are:

4.1.1. The case for adopting the Exogen® ultrasound bone healing system to treat long bone fractures with **non-union** (failure to heal after 9 months) is supported by the clinical evidence, which shows high rates of fracture healing.

4.1.2. The Exogen® ultrasound bone healing system to treat long bone fractures with **non-union** is associated with an estimated cost saving of £2,407 per patient compared with current management, through avoiding surgery. *Note: This is an increase on previous saving estimates (MTG12 January 2013 estimated cost saving of £1164 per patient) primarily because length of hospital stay if a patient has surgery has increased from 4.9 days to 7 days in the cost comparison analysis.*

4.1.3. There is some radiological evidence of improved healing when the Exogen® ultrasound bone healing system is used for long bone fractures with **delayed healing** (no radiological evidence of healing after approximately 3 months). There are substantial uncertainties about the rate at which bone healing progresses without adjunctive treatment between 3 and 9 months after fracture, and about whether or not surgery would be necessary. These uncertainties result in a range of cost consequences, some cost saving and others that are more costly than current management.

4.2 The NICE costing template accompanying the original NICE MTG12 January 2013 used the assumptions below to inform its cost saving estimates. The costing template has not been updated with the recent review, however, NICE have determined that the new system is more cost-effective than previous estimates for non-union fractures.

- 21.4% of fractures are non-union after 9 months
- Around 50% (and locally up to 70%) of non-unions are not suitable for Exogen® therapy
- 82% of patients do not heal after either 6 months following surgery or 6 months following Exogen®, thus resulting in the same failure rate of 18%.

5. Evidence Review

5.1. The NICE review in 2013 of Exogen® when used for long-bone fracture with non-union was from observational studies with limited outcomes but with good clinical results, with healing rates ranging from 75% to 100% (depending on the long bone involved and duration of non-healing) over a period of 4.6 to 7.3 months and hence the reason for support from NICE.

5.2. The evidence for use of Exogen® when used for long bone fracture and delayed healing is more limited and the outcomes varied. In addition there are uncertainties about the rate at which healing progresses between 3 and 9 months after fracture, both with and without Exogen®, and about whether surgery would be required if Exogen® were not used. Some of the delayed healing studies include a significant number of patients (50%) considered to be non-union, with no sub-group analysis.

5.3. The evidence was not assessed for other indications associated with the use of Exogen® ultrasound bone healing system.

5.4. NICE IPG623 published in July 2018 found the evidence for low-intensity pulsed ultrasound (LIPUS) to promote healing of delayed-union and non-union fractures (across all types of fractures) raises no major safety concerns. The current evidence on efficacy is inadequate in quality. Therefore, this procedure should only be used with special arrangements for clinical governance, consent and audit or research.

5.5. The NICE guidance evidence update for Exogen® in 2019 identified 3 systematic reviews (of limited benefit for this review) and 5 observational studies reporting healing rates for long bone non-union fractures ranging from 32.8% to 88% (depending on the long bone involved and the duration of non-healing). Data from 3 relevant NHS audits showed a healing rate ranging from 39 to 72%.

5.6. Overall the additional clinical evidence identified since the guidance was published in 2013 supports the current recommendations.

5.7. Adverse events associated with use of Exogen® appear to be minimal, with 3 cases of skin irritation (from the coupling gel) and 1 report of chest pain (associated with a cardiac pacemaker) during a 1 year period of use reported on a database operated by the FDA and MAUDE (Manufacturer and User facility Device Experience). The manufacturer's suggested that 55,000 devices were used during this time period.

- None of the clinical studies reported device-related events and no safety concerns were identified by the external assessment centre in relation to Exogen®.
- Reports on surgical treatment of non-union and delayed healing fractures documented adverse events including postoperative wound infection, osteomyelitis and pain.

6. Patient Eligibility

6.1. **Use of Exogen® for long bone fractures with <u>non-union</u>**
Exogen® will be funded where the following criteria are met:

a. Clinical

- Patient age > 18 years
- Non-union of fracture > 6 months and < 12 months
- Not to be used in cases of unstable surgical fixation, not well aligned or where inter-fragment gap is > 10mm
- Not to be used in cases with infection
- Not to be used in pregnancy, patients with pacemakers or vertebral/skull fractures

Note: patients with lifestyle factors which are known to delay fracture healing rates e.g. smoking and excess alcohol intake, will be appropriately counselled and required to eliminate these risks before determining non-union status and ultimately eligibility for Exogen®. Where appropriate, referrals to specific support services should be arranged e.g. smoking cessation service.

b. Process

- Patient ability to comply with usage protocol and criteria
- Patients to be screened and referred by Consultant Orthopaedic Surgeon following review on at least two occasions at least 4 weeks apart to allow examination of serial x-rays
- Further assessment in non-union clinic by surgeon with expertise of dealing with non-union of long bones; Appropriateness of Exogen® to be determined through agreement of 2 Specialist non-union Consultants.
- Regular audit of outcomes to be undertaken and participation in regional network where available.

These criteria will be reviewed/updated on publication of new evidence in the form of relevant trial data, updated national guidance or national or local audit outcomes.

Reporting requirements and funding arrangements are detailed in Appendix 1.

6.2. **Use of Exogen® for long bone fracture with <u>delayed healing</u>**
Exogen® will not be funded for use in this indication.

6.3. **Other indications for use of Exogen®:**
No other indications for use of Exogen® ultrasound bone healing system outside these indications will be funded.

Any identified new indications for use require submission of a new technology request form for consideration by the Clinical Commissioning Policy Collaboration.

7. Supporting Documents

- NHS Herefordshire & Worcestershire: Individual Funding Request Operating Procedure
- NHS Herefordshire & Worcestershire: Prioritisation Framework for the Commissioning of Healthcare Services
- WM01 – Ethical Framework
- WM02 – Orphan Drugs
- WM03 – Patients Leaving Industry Sponsored Trials
- WM05 – NICE Guidance
- WM07 – Choice
- WM08 – In Year Service Developments
- WM09 – Individual Funding Requests (to be read with local process document)
- WM10 – Patients Leaving Non Commercially Funded Trials
- WM11 – Patients Leaving a CCG Funded Trial
- WM12 – Patients Changing Responsible Commissioner
- WM13 – NHS Private Interface
- WM14 – Experimental Treatments
- WM15 – Trial of Treatment
- NHS Constitution, updated 27th July 2015
- NICE: Exogen® ultrasound bone healing system for long bone fractures with non-union or delayed healing. Medical Technology Guidance 12. January 2013.
- NICE: Review of Medical Technology Guidance 12. Review Decision October 2019.
- NICE: Low-intensity pulsed ultrasound to promote healing of delayed-union and non-union fractures. Interventional Procedures Guidance 623. July 2018.

8. Appendices

Appendix 1

Reporting Requirements and Funding Arrangements

Commissioner funded Exogen® Ultrasound Bone Healing System for Long Bone Fractures with Non-union

1. Reporting Requirements – All Approved Indications

Date initiated	Purchaser Code	Hospital Site	Pseudonymised Patient Number	Duration Non-healing (weeks)	Stability Y/N	Type or location of fracture	Alternative treatment procedure code	Treatment Success/Failure S/F	Date final assessment	Time to heal/fail (weeks)	Refund for failure Y/N	Cost Exogen® claimed

This information should be provided quarterly to the Joint Information Group for validation purposes and will assist with audit of outcomes. Without this level of data Commissioners will be unable to authorise charges for Exogen®.
It is possible that during 2020/21, the Blueteq system for ensuring compliance of use for new technologies will be applied to Exogen®.

2. Funding Arrangements

Exogen® will be funded for patients meeting the clinical criteria listed in section 6.2. For treatment failures, providers will ensure that a reimbursement is obtained in accordance with the manufacturers "money back guarantee" arrangement; commissioners will not fund these patients.

The funding of Exogen® will be made available at the end of treatment when the outcomes in terms of success or failure are known. A log of users will be kept which will be utilised for invoicing purposes and includes a log of failures and refunds obtained in accordance with the Bioventus program – Exogen Performance Guarantee. This system may no longer be necessary once the BlueTeq system is introduced and used for appropriate patients.

Additional points to note:

- The Provider will notify the Commissioner if expenditure forecasts suggest expenditure to be >10% of planned levels; investigating these to reduce CCG financial risk.
- Annual audit of use should be undertaken.

9. Equality Impact Assessment

Organisation	NHS Herefordshire & Worcestershire Clinical Commissioning Groups		
Department	Contracts & Policy Development	Name of lead person	Fiona Bates
Piece of work being assessed	Exogen® Ultrasound Bone Healing System for Long Bone Fractures with Non-Union or Delayed Healing		
Aims of this piece of work	To outline the circumstances for commissioning of Exogen®		
Date of EIA	January 2020 (previously March 2014)	Other partners/stakeholders involved	Herefordshire & Worcestershire Policy Alignment Task & Finish Group
Who will be affected by this piece of work?	Patients and Surgeons		

Single Equality Scheme Strand	**Baseline data and research on the population that this piece of work will affect.** What is available? E.g. population data, service user data. What does it show? Are there any gaps? Use both quantitative data and qualitative data where possible. **Include consultation with service users wherever possible**	**Is there likely to be a differential impact?** Yes, no, unknown
Gender	There is no correlation between gender and non-union or delayed union of fractures, although problems in healing are more common amongst males since they have a higher incidence of high energy fractures.	No
Race	Cardiovascular-related illnesses are more prevalent in men from the Indian subcontinent. Peripheral vascular disease adversely affects the blood flow to the tissues, including the bone and the surrounding soft-tissue envelope; this will impair delivery of oxygen, inflammatory cells and nutrients to the fracture site and may affect bone healing rates.	Yes
Disability	Diabetes is more prevalent in black and minority ethnic people. Clinical studies have demonstrated a significantly higher incidence of delayed union, non-union, and a doubling of the time to healing of the fracture in diabetic compared with non-diabetic patients. There could be issues in a patient's ability to operate this device if they have physical disabilities.	Yes

Religion/ belief	There is no correlation between an individual's religion or belief system and non-union or delayed union of fractures.	No
Sexual orientation	There is some anecdotal evidence that people who are part of the LGBT community are more likely to smoke. There is evidence that smoking can impact on an individual's healing rate, which may, therefore, impact on patients with non-union or delayed union of fractures.	Yes
Age	The safety and effectiveness of Exogen has not been established in patients with skeletal immaturity i.e. children and adolescents. Children and adolescents have much higher healing rates (around 99%) and are unlikely to require this intervention. While the majority of patients being treated for fractures are unlikely to have a nutritional deficiency, a significant minority, particularly in the elderly with fragility fractures may have. Overall, there is some evidence that increasing age is a factor in the inhibition of fracture repair in the human. In addition to the slowing in the process of repair, many problems are encountered in the elderly as a result of difficulties in maintaining fixation of weak, osteoporotic bony fragments for sufficient time for union to occur.	Yes
Social deprivation	**Malnutrition** Nutritional and metabolic requirements increase during fracture repair. **Smoking** has been shown to adversely affect bone mineral density, lumbar disc disease, the rate of hip fracture, and the dynamics of bone and wound healing. **Alcohol** Chakkalakal et al reviewed the effects of alcohol on the skeleton and fracture repair in 2005. He concluded that chronic consumption of excessive alcohol eventually results in an osteopenic skeleton. Alcoholics experience not only an increased incidence of fractures from falls, but also delays in healing compared with non-alcoholics	Yes
Carers	No issues	No
Human rights	The CCG does not intend this piece of work to affect anyone's human rights.	No

Equality Impact Assessment Action Plan

Strand	Issue	Action required	How will you measure the outcome/impact	Timescale	Lead
Race	Certain ethnicities may have higher prevalence of related illness'	N/A CCG cannot influence this issue; the same criteria will apply to all patients presenting.	-	-	-
Disability	Certain ethnicities may have higher prevalence of related illness'	N/A CCG cannot influence this issue; the same criteria will apply to all patients presenting.	-	-	-
Disability	Ability to operate device in the home environment	Affected patients to be given additional support to determine whether they or their carers can operate the device in accordance with the requirements. Unsuitable patients will be offered the alternative management option involving surgery.	Acute trust clinical audit of outcomes to be presented to commissioner for all user groups.	6 monthly	CE
Sexual Orientation	LGBT people more likely to smoke	These factors are reversible and elimination improves union rates. The criteria require removal of inhibitory factors before progression to use of the device. Patients should be referred to appropriate support services ie. dietetic advice, smoking cessation services and alcohol counselling.	Acute trust clinical audit of outcomes to be presented to commissioner for all user groups.	6 monthly	CE
Age	Not appropriate for use in patients lacking skeletal maturity ie. children and adolescents	No action. These patients will be offered the alternative management option involving surgery.	N/A	-	-
Age	Age a factor in fracture repair	N/A CCG cannot influence this issue.	-	-	-
Social Deprivation	Nutrition, smoking and alcohol intake	These factors are reversible and elimination improves union rates. The criteria require removal of inhibitory factors before progression to use of the device. Patients should be referred to appropriate support services ie. dietetic advice, smoking cessation services and alcohol counselling.	Acute trust clinical audit of outcomes to be presented to commissioner for all user groups.	6 monthly	CE