General Instructions
gSource Drills

The instructions that follow relate to proper use and handling of medical drills, drill bits, twist drills or similar products from gSource. For additional information and instructions regarding reprocessing and sterilization of reusable surgical instruments, see *Instructions for Use – Reusable Surgical Instruments.*

To avoid the potential breakage of drills during surgery and medical procedures, select the appropriate bit size and type based on bone density, use proper technique with consistent pressure and irrigation, monitor for signs of excessive heat or resistance, regularly change drill bits when necessary, and ensure the surgical equipment is in working order. This includes checking for any damage or wear on the drill bit itself prior to and at points throughout surgery and medical procedures.

gSource advises that the key strategies to prevent drill bit breakage that follow are considered when using gSource drills.

Drill Bit Type
It is critical to thoroughly evaluate and determine the precise specifications, design features, and material attributes of surgical drills when making an informed decision about which specific drill to use for a given procedure, as these factors directly impact performance, precision, patient safety, and overall surgical success.

Select a drill bit based on user preferences, consider the following factors:

- Appropriate flute design and lengths for optimal removal
- Drill diameter
- Point angle
- Material
- Adapter

When deciding these factors, consider the following:

- Type of procedure
- Bone density and hardness
- Desired hole size and screw fit
- Handpiece compatibility with adapter

Proper Drilling Technique
Proper surgical technique is crucial for safe and effective use of drill bits; always follow established surgical protocols and seek adequate training

1. **Confirm the drill bit is securely attached to the handle**
   When a drill bit is not properly secured in the chuck, it can wobble and experience uneven pressure, concentrating stress on specific areas of the bit, making it more prone to breakage. A loose fit can lead to difficulty in accurately controlling the torque applied to the drill bit, which can result in excessive force and potential breakage.
2. **Begin with a smaller pilot drill**
   When drilling in critical areas, gSource recommends the operator begins with a smaller pilot drill bit to guide the larger drill bit accurately. When needed, the operator may use sequential drilling by progressing through various drill sizes to achieve the desired depth and diameter. This will reduce the chances of potential damage occurring to the bone, tissue or drill bit itself.

3. **Maintain a firm and controlled grip**
   During the entire drilling portion of the procedure, maintain a firm grip on the drill handle to ensure accuracy and prevent unintended movements. It is important to remain aware of bone density. Adjust drilling parameters based on the patient's bone density.
4. **Apply consistent, moderate pressure throughout the drilling process**
   If applicable, continuously cool the bit and remove bone debris. This may be critical to overall success for the drill in operations. Throughout the entire drilling process, maintain the correct angle of the drill bit to avoid excessive stress on the tip.
5. **Monitor for signs of stress on drill**
   Heat of the drill bit and unexpected resistance are some of the most common causes of failure and determining the success of holed drilling in bone. If the drill bit becomes excessively hot, stop drilling and allow it to cool down before continuing. When encountering unexpected resistance, be cautious as it could indicate a need to adjust the drill bit or technique before continuing.

Equipment Maintenance

Ensure the drill is in good working order to confirm that it will be functional during the procedure. Properly clean and sterilize all surgical instruments according to protocols for reprocessing. Additional information on the cleaning, sterilizing and reprocessing of reusable surgical instruments can be found in *Instructions for Use – Reusable Surgical Instruments.*

To maintain optimal performance and prevent breakage, regularly inspect the drill bit for signs of wear, including dull edges, excessive burrs, or cracks. Promptly replace the bit when significant wear is detected to ensure efficient and safe operation during use. Always use sharp drill bits to minimize trauma and heat generation during drilling.

In Case of Drill Breakage

In the rare occasion that a drill bit breaks during a surgery or other medical procedure, it is important to do as instructed below in addition to additional steps the surgeon and their team may take to protect the safety of the user, patient and outcome of the procedure.

1. **Stop drilling immediately**
   Once an issue is recognized, the surgeon should not attempt to force the broken bit further into the bone as this may cause it to be permanently embedded or require another procedure for removal.
2. **Assess the situation at hand**
   Carefully evaluate the location of the broken drill fragment and the potential risks to surrounding tissues.
3. **Consider additional options such as removal**
   Depending on the situation at hand, the surgeon may need to carefully remove the broken fragment, change the drill bit, or potentially modify the surgical plan.

When to avoid using a Drill in surgery

A drill bit should not be used in surgery when there is a high risk of damage to nearby critical structures like nerves or blood vessels, when the bone is too thin or fragile, when the surgeon suspects a potential for excessive heat generation due to drilling, or if the surgical site is in a location where a broken drill bit fragment could be difficult to remove and cause complications.

If poor bone quality may exist in the area where the surgeon intends to operate, using a drill is likely not a feasible option since the delicate bone could be further damaged. An example of this is in cases of severe osteoporosis or osteogenesis imperfecta where the bone is too weak to withstand drilling forces being exerted onto the patient's bone. Additionally, if a high risk of thermal damage exists in areas where excessive heat generation could cause tissue necrosis, like in poorly vascularized regions, avoid using a drill.