

# Silicone Drains Bellovac® Exudrain®



## Wound Drainage at its Best

NURSING INFORMATION ON THE CARE OF SURGICAL WOUND DRAINS

# About this booklet

This booklet has been compiled to guide you through important aspects of surgical wound drain care.

Our best attempt has been made to gather up-to-date information and offer clinically supported advice regarding products and their management. Please remember to refer to your Hospital policy and/or follow Clinician specific instructions.

Throughout this booklet, there are numerous learning opportunities relating to the following areas of the National Safety and Quality Health Standards:

**Standard 1 - Governance for Safety and Quality in Health Service Organisations**

**Standard 3 - Preventing and Controlling Healthcare Associated Infections**

What is a wound drain?

A wound drain is a tube to remove unwanted pus, blood, gas or other fluids (described collectively as exudate) from a specific wounded body area eg after surgery.

Wound drain tubes can be completed by connecting a reservoir to collect the exudate. This is called a wound drainage system, and the various styles and features will be detailed in this booklet.



# Wound Drains

## Why are wound drains used?

Further to removing unwanted exudate from the wound site, wound drains also:

- Promote tissue apposition which facilitates cavity closure and wound healing and reduces bleeding or exudate production.
- Allow clinicians to measure and assess exudate.
- Reduce infection risk from exudate build up.
- Reduces patient discomfort eg. haematoma.
- Monitor leakage eg. urine leak after urological operations.



# Wound Drains

## The components of a wound drain system

As mentioned, a wound drain tube can be used on its own or in combination with a wound drain reservoir.

## Stand-alone Wound Drain Tubes

Examples of wound drain tubes that can be used on their own include the Penrose and Yeates drains.

## Wound Drain Tubes with Wound Drain Reservoirs

When used in combination, a wound drain tube and a wound drain reservoir can create a wound drain system. Typically, a wound drain tube is made from either a PVC or silicone material. Silicone wound drain tubes are softer and available in a wider range of styles (ie round, flat, multi-channeled) than PVC tubes, offering advantages of increased drainage performance and patient comfort. They are however, less tolerant to high pressure suction because of their more subtle composition.

Silicone wound drain tubes are commonly used for (but not limited to):

- Delicate areas eg Plastic, Reconstructive, ENT surgery.
- High volume and/or viscous fluid.
- Extended in-situ placement eg Breast surgery.



There are various types of wound drain reservoirs with differences including:

- Capacity of the reservoir
- Size of the connection to a wound drain tube eg FG10, FG14, Universal
- Soft or hard reservoir
- Suction/Negative pressure level
- Ability to re-establish suction/negative pressure
- Infection control features eg one-way valves, clamps
- +/- a changeable collection bag

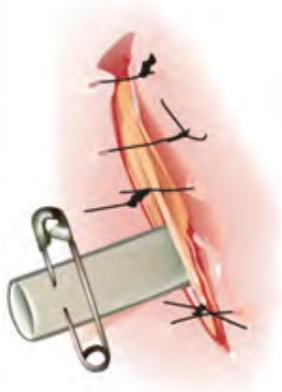
# Open vs Closed wound drain systems

One way to classify wound drain systems is to consider whether it is open or closed.

## Open Wound Drain System

An open wound drain system allows interaction between the wound/exudate and the external environment (and vice versa). These include Penrose and Yeates drains. Drainage occurs when there is a pressure gradient between the cavity being drained and the external environment.

The exudate is captured in a dressing or drainage bag. When dressings are removed and wound drain reservoirs are emptied into a collection dish, this creates an open wound drain system with risks including infection and splash hazard for the health care provider and patient<sup>1</sup>.



Penrose drain



Yeates drain

# Wound Drains

## Closed Wound Drain System

A closed wound drain system has mechanisms in place to prevent the interaction between the wound/exudate and the external environment. This may include built-in clamps, one-way-valves and collection bags to create barriers or contain the exudate. The system remains closed even when re-vaccing and removing collected exudate (i.e. exchanging the collection bag/reservoir).

Closed wound drain systems are generally preferable to open systems as they:

- Are associated with lower infection rates.<sup>2</sup>
- Reduce risk of contaminating staff and other patients.<sup>1</sup>
- Facilitate more accurate drainage output measurement.
- Have the potential to create a negative pressure i.e. suction.<sup>3</sup>
- Protect the skin from irritating exudates.<sup>1</sup>
- Minimise nursing time associated with high exudate outputs eg. dressing changes.<sup>4,5</sup>



Bellovac®



Exudrain®

# Wound Drains

## High suction vs Low suction vs Passive wound drain reservoirs

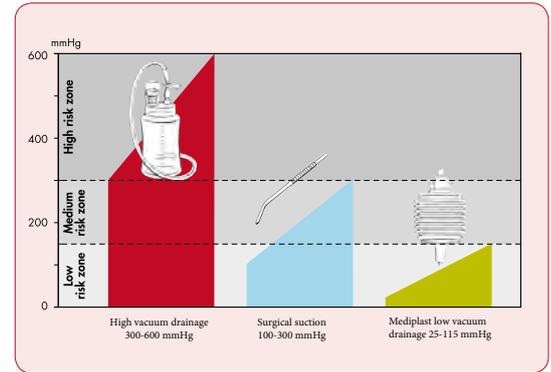
Negative pressure can be created by manually expelling air from an expansile collection reservoir or from machine generated suction (eg wall suction outlet). The peak negative pressure of wound drain reservoirs can be graded as follows:

HIGH	300mmHg+
MEDIUM	150-300mmHg (NB Equivalent to surgical suction)
LOW	< 150mmHg

Passive non-suction, also known as gravity draining, can also help in wound drainage when the tip of the wound drain is inserted in the dependent part of the cavity whilst the collection reservoir is placed below the body. Note that the aid of gravity can vary depending on the patient's position.

There are many advantages to using low-suction and closed wound drain systems, like Bellovac and Exudrain:

- Efficient suction<sup>3</sup>
- Less blood loss<sup>4</sup>
- Better drainage collection<sup>5</sup>
- Earlier removal of drain<sup>6</sup>
- Less tissue aspiration<sup>7</sup>



High vacuum, as in pre-evacuated bottles, may easily cause tissue grab. Compare this with surgical suction, where great care is taken to avoid aspiration of tissue.

# Key Summary Points

## Choosing the right wound drain system

Consider:

- What and how much is being drained - to select the right size and pressure of wound drain system.
- Where is the drain located - as delicate/vital tissue require softer wound drain tubes and closed systems.
- Wound drain tubes and wound drain reservoirs work best when they are compatible.

For example:

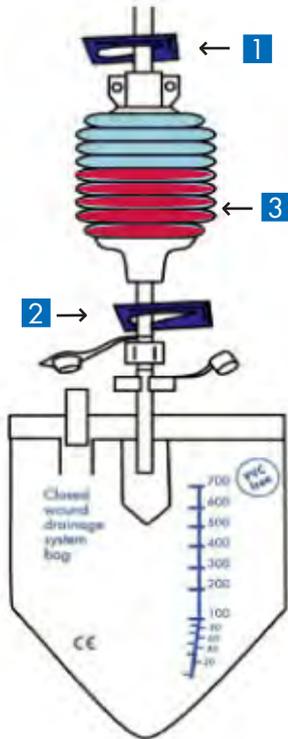
- Combining a FG15 wound drain tube from one manufacturer with a FG14 wound drain reservoir from another manufacturer may cause difficulty with maintaining a firm connection, de-vacating issues and an increased infection risk.
- Silicone wound drain tubes are not designed to withstand the force of high pressure wound drain reservoirs and may lead to tube occlusions and patient discomfort.

Wound drain systems should be:

- Simple to manage for both staff and patient
- Hygienic and effective at evacuating exudate
- Gentle on tissue
- Designed to not potentiate infection
- Easy to remove
- Cost efficient

# How to use a Bellovac

A



## A. Emptying

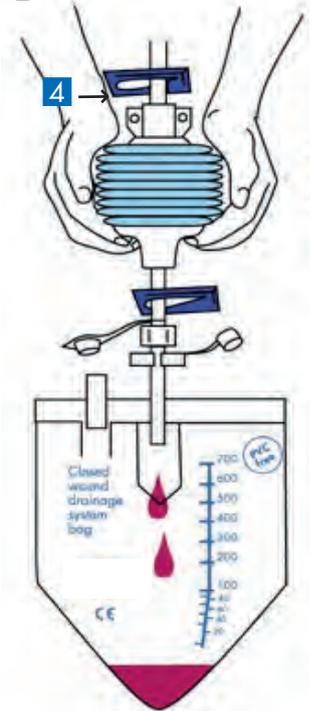
1. Close the inlet clamp (above the bellows).
2. Check that the outlet clamp is open.
3. Squeeze the bellows slowly, so that the fluid is transferred into the bag. You may need to use two hands. The valves in the bellows outlet and bag prevent the fluid going back into the bellows so it is safe to release the bellows and squeeze again if this is easier.

## B. Reactivating (restarting drainage)

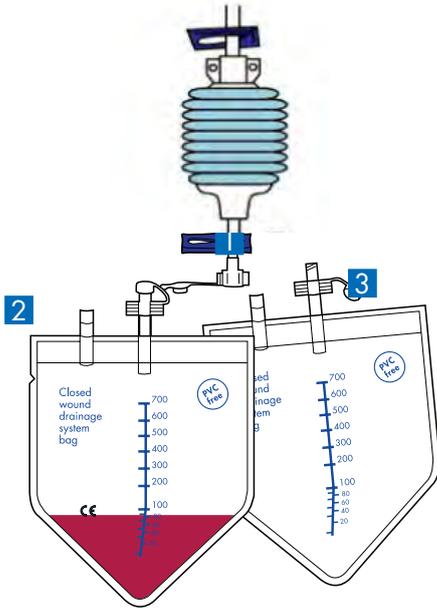
4. Release the bellows and then open the inlet clamp.

Check that the inlet tubing is not kinked or bent – this can prevent the drain from working properly.

B



C



### C. Changing bags

1. Close the outlet clamp.
2. Unscrew the bag and seal it with the cap.
3. Attach a new bag by screwing it tightly to the connector.

#### If you use Bellovac without a bag

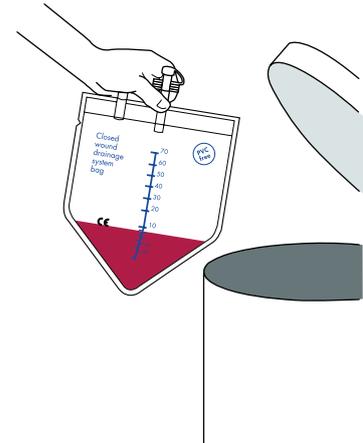
At home, with the agreement of the Clinical Care Team, Bellovac can be used without the bag.

However, when emptying the fluid in the bellows it is recommended to connect a bag. Instructions:

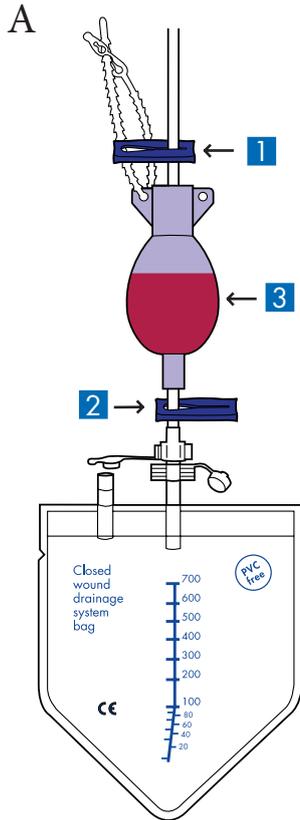
1. Connect a bag to the bellows.
2. Emptying:
  - Close the inlet clamp
  - Check that the outlet clamp is open
  - Squeeze the bellows
  - Open the inlet clamp
3. Removing the bag:
  - Close the outlet clamp
  - Unscrew the bag and seal it with the cap

#### Disposal of bags

Seal the bag with the cap and place it in a suitable container. The bag is then disposed of following the instructions given by the hospital.

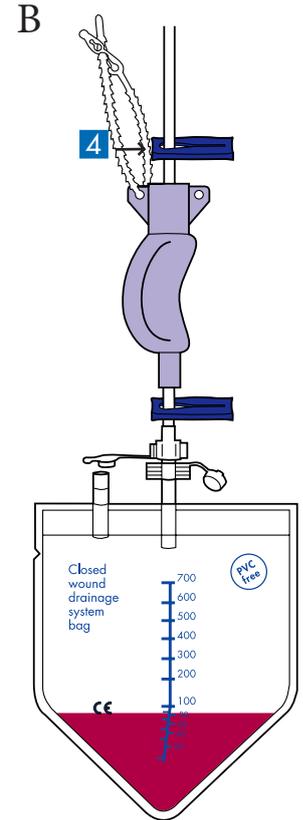


# How to use an Exudrain



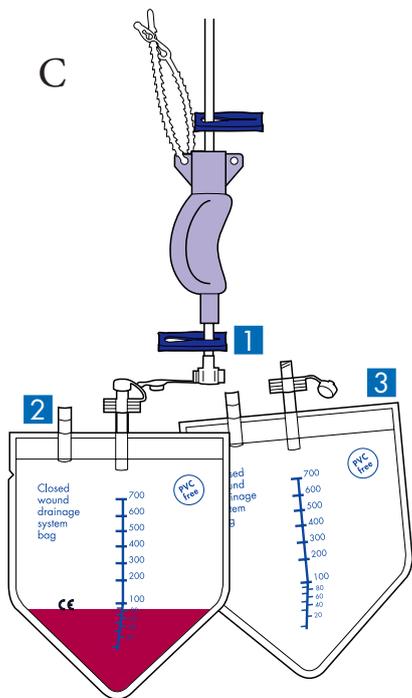
## A. Emptying

1. Close the inlet clamp (above the bulb).
2. Check that the outlet clamp is open.
3. Squeeze the bulb slowly with one hand, so that the fluid is transferred into the bag. The valves in the bulb outlet and bag prevent the fluid going back into the bulb so it is safe to release the bulb and squeeze again if this is easier.



## B. Reactivating (restarting drainage)

4. Release the bulb and then open the inlet clamp.  
Check that the inlet tubing is not kinked or bent - this can prevent the drain from working properly.



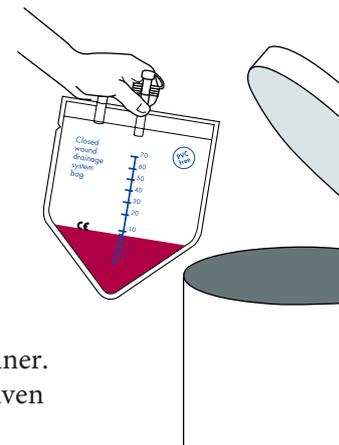
### C. Changing bags

1. Close the outlet clamp.
2. Unscrew the bag and seal it with the cap.
3. Attach as new bag by screwing it tightly to the connector.

### If you use Exudrain without a bag

At home, with the agreement of the Breast Care Team, Exudrain can be used without a bag. However, when emptying the fluid in the bulb it is recommended to connect a bag. Instructions:

1. Connect a bag to the bulb.
2. Emptying:
  - Close the inlet clamp
  - Check that the outlet clamp is open
  - Squeeze the bulb
  - Open the inlet clamp
3. Removing the bag:
  - Close the outlet clamp
  - Unscrew the bag and seal it with the cap

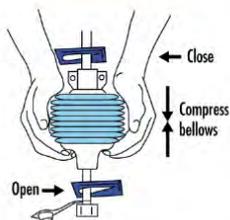


### Disposal of bags

Seal the bag with the cap and place it in a suitable container. The bag is then disposed of following the instructions given by the hospital.

# Bellovac<sup>®</sup> – Low Pressure Wound Drain System – Instructions for Use

## Getting started in theatre

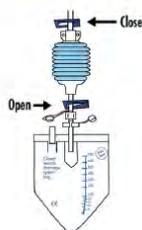


1. Close the inlet clamp. Create vacuum in the bellows by ensuring the outlet clamp is open and squeeze the bellows. (Bellows will not expand when released due to the one-way outlet valve).
2. Screw the drainage bag to the base of the bellows.
3. Connect the pre-evacuated drain to the drainage catheter.
4. Open the inlet clamp to start wound drainage.

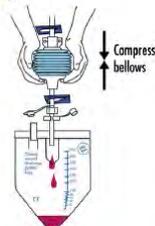
- ✓ Check that the inlet tubing is not kinked or bent – this can prevent the drain from working properly.

## Emptying the bellows

Step 1:



Step 2:  
Close the inlet clamp. (Ensure outlet clamp is open).



Compress the bellows fully.

- ✓ This can be done slowly and in stages. The bellows will not re-expand due to the one-way outlet valve.

Step 3:



Re-open the inlet clamp.

- ✓ Due to the addition of a 3rd one-way valve, outlet clamp is to remain open during wound drainage.
- ✓ Closing of the outlet clamp is required prior to bag change to prevent spillage.

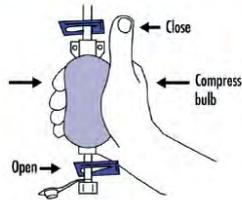
## Removing the collection/ drainage system



1. Undertake removal under aseptic conditions and with adherence to hospital protocol.
  2. Slide the inlet clamp up the tubing above the bellows to a point just below the connection to the catheter and close it off.
  3. Leave the drain clamped off for a minimum of 30 minutes to allow the vacuum within the wound to dissipate.
  4. Remove any securing sutures or dressings.
  5. Support the wound area surrounding the catheter and slowly pull the catheter out of the wound with a slight rotating motion.
- ✓ If the catheter is difficult to remove, do not force it. Please inform the surgeon.

# Exudrain® – Low Pressure Wound Drain System – Instructions for Use

## Getting started in theatre

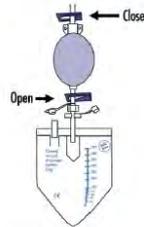


1. Close the inlet clamp. Create vacuum in the bulb by ensuring the outlet clamp is open and squeeze the bulb. (Bulb will not expand when released due to the one-way outlet valve).
2. Screw the drainage bag to the base of the bulb.
3. Connect the pre-vacuumed drain to the drainage catheter.
4. Open the inlet clamp to start wound drainage.

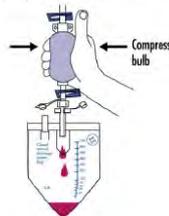
- ✓ Check that the inlet tubing is not kinked or bent – this can prevent the drain from working properly.

## Emptying the bulb

Step 1:



- Step 2:  
Close the inlet clamp. (Ensure outlet clamp is open).



Compress the bulb fully.

- ✓ This can be done slowly and in stages. The bulb will not re-expand due to the one-way outlet valve.

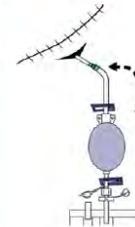
Step 3:



Re-open the inlet clamp.

- ✓ Due to the addition of a 3rd one-way valve, outlet clamp is to remain open during wound drainage.
- ✓ Closing of the outlet clamp is required prior to bag change to prevent spillage.

## Removing the collection/ drainage system



Slide clamp to a point just below the connection and close off

1. Undertake removal under aseptic conditions and with adherence to hospital protocol.
  2. Slide the inlet clamp up the tubing above the bulb to a point just below the connection to the catheter and close it off.
  3. Leave the drain clamped off for a minimum of 30 minutes to allow the vacuum within the wound to dissipate.
  4. Remove any securing sutures or dressings.
  5. Support the wound area surrounding the catheter and slowly pull the catheter out of the wound with a slight rotating motion.
- ✓ If the catheter is difficult to remove, do not force it. Please inform the surgeon.

## Common questions - and answers

What to do if...

**...the area around the catheter feels swollen and warm:**

This can occur during the healing process, but it is always a good idea to check that the wound has not been infected. There may be a need to aspirate (remove) a build up of fluid which has not been able to escape through the drain.

**...the bellow/bulb is becoming fully expanded but very little or no fluid is being collected:**

This may indicate that the catheter has been partially pulled out of the wound.

**...The fluid coming out is now semi-transparent, but for the first few days it was red:**

This is quite normal and shows that the wound is healing well. There is no more blood coming from the wound, only tissue fluid and lymph.

**...the bellow/bulb is fully expanded and half full, but it cannot be squeezed and fluid cannot be transferred to the bag:**

1. Check that the outlet (lower) clamp is open and try again.
2. Replace the bag with a new one and try again.
3. Gently shake the bellows/bulb. There might be a clot obstructing the outlet. Shaking will loosen the clot.

## Trouble Shooting:

Fluid can stop flowing through a drain if: fluid production ceases; cavity being drained is completely evacuated and collapsed; drain holes are blocked (by tissue, blood clots etc); drain lumen is blocked (by blood or fibrin clots etc); drain is kinked; suction pressure source is inactivated or disconnected



## Points to Remember:

- When the reason is gone, the drain should be gone.
- Understanding the reason will assist with the care of a drain.
- A drain should not exit a body cavity through the surgical incision.
- A drain should reach the skin by the shortest safe route.
- Size and length must be appropriate.
- Drains must be inserted away from delicate tissues eg nerves, vessels and anastomotic sites.
- A drain should be firmly secured at its exit site (eg with braided suture) and at one other point (eg with adhesive tape). A drain should be secured at its exit site according to Hospital policy or Surgeon instructions.

# Key Competencies (with a Bellovac and Exudrain):

- Describing open and closed wound drain systems
- Understanding high, low and passive wound drain reservoirs
- Describe what one-way valves do
- Identify the 3 one-way-valves
- Understanding the role of the blue clamps
- List the 3 times you clamp a Bellovac/Exudrain
- Can you identify PVC and Silicone drain tubes
- How to remove suction
- How to remove a Bellovac/Exudrain



## References:

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2. Dougherty SH, Simmons RL. The biology and practice of surgical drains. Part 1. Gerr Probl. Surg.1922; 29: 559-623
3. Loder P, Smith G et al. Aust. NZJ Surg 1987;57:531-5.
4. Morgan-Jones RL, Perko MMJ, Cross M. The Knee 2000;7:149-50.
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7. Gerngoss H, Marquardt K. Chirurg1992;63:447-53.

Other acknowledgements: Ngo Q, Lam V, Deane S. Drowning in Drainage - The Liverpool Hospital Survival Guide to Drains and Tubes. 2004







Also available -  
Early Discharge with Exudrain Drains (EDWED)  
Early Discharge with Bellovac Drains (EDWBD)  
Wound Drains  
Smooth Operators  
Wound Drains - The Perfect Fit  
BABT brochure  
IFU wall charts  
BABT Swing tag



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