Ligature performance assessment requirements (DRAFT)

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Fixed products

A product intended to be permanently attached that does not have parts operable by service users.

Forms of ligature with load:

1. Hooking over or under, or to the side on products (multi-directional) – ligature cord attached to product, pulled in variety of directions (undamaged)
2. Products with insecure fixing or insufficiently robust substrate (to fix to), damaged and exposing ligature point (connecting cord to fixings or created hole)
3. Digging around products into wall structure to expose ligature points
4. Ligature point through window mesh or shower drains (ligature through small holes) or window trickle vents
5. Ligature points at joints or holes (thin slot) on LST/radiators cover or fixed furniture or hinge knuckle
    a. Using an external item in hole or slots (ie. toothbrush or staff ID card) to form/create a ligature point by wedging in a gap – holding ability of this?
    b. Wedging knots (bed sheets) in recesses or slots
    c. Solid item inserted in slot and rotated (ie. pen inserted and rotated)

Test requirements:

- Multi-directional load
- Grades of weight to apply (3kg / 5kg / 10kg / 20kg) – clinical input required
- Relation of circumference of cord to weight (suffocation c.f. internal damage)
- Test before and after damage

Movable fixed products

A product that is part of the built fabric, but operable by a service user. Ligature risk assessments are different as the product can be moved to various positions to create a ligature point. An example of this product could be a door or a window.

Forms of ligature with load:

1. Trapping (by clamping) between two movable components ie. between door and frame
2. Sliding panels on windows, wedging in gap, then window moving it further to enhance anchor
3. Enlarged gaps manipulated with a shoe
4. Gaps in hinges?
5. Connection point between two moving parts
6. Binding of door on frame or stop (stressing door by over-opening/extending) to create temporary gap (must be tested within manufacturers guidance)
7. Handles working loose over time – creates ligature point
8. Lock latch bolt
9. Conical turns (handles or showers adjustments) – gaps between the turn and the frame

Test requirements:

- Multi-directional load
- Grades of weight to apply (3kg / 5kg / 10kg / 20kg) – clinical input required
- Relation of circumference of cord to weight (suffocation c.f. internal damage)
- Ability to create ligature during normal (in context of MH) and strained operation of moveable product
- Testing before/after life-cycle to simulate wear and tear (10k operations? Between maintenance regime / MOT suggestion)

Load release products

A product that has two states, normal use (core function) and release function where the product will react to an abnormal load and fall away or collapse to prevent a ligature.

Forms of ligature with load:

1. [Important to acknowledge that all load release items have a fixed product base/anchor that needs to be assessed differently]
2. [weight of load release items, opportunity for accidental harm (ie. towel holder falling on foot)]
3. Ligature connecting to load release item – will it release at sufficient load?
4. Load release item used to create an additional ligature risk/tool once detached
5. 'Bunching' load release points to give distorted load release weight value
6. Manipulating load release connection – ie. trapping bed sheet in connecting interface to distort load characteristics
7. Multiple attempts – testing load release after extended periods of use
8. Preloaded/empty item – ie. towel rail or paper towel dispenser tested empty or not
9. Non-vertical load release characteristics
10. Wedging load release track in smaller space (guidance point?)

Test requirements:

- Multi-directional load
- Grades of weight to apply (3kg / 5kg / 10kg / 20kg) – clinical input

- Relation of circumference of cord to weight (suffocation c.f. internal damage)
- 'Bunching' effect on load characteristics
- Manipulation of load release mechanism to distort load release characteristics
- Risk of ingestion of load release mechanism

Abnormal load detection systems

There are a number of systems that now detect a ligature being attempted. These considerations with these products are different as they do not eliminate the risk of a ligature, but alert when it occurs. The focus of the assessment is the reliability of these systems.

Forms of ligature with load:

1. Verifying the abnormal load applied to trigger the alarm
    a. Direction of force
    b. Time responsiveness
    c. Load sensitivity (ability to adjust)
2. Problem of unwanted alarms
3. Ability to block signal from sensor to alarm base (using commonly available tools)
4. Ensuring device doesn't undermine other functionalities (ie. smoke or acoustic seal on bedroom door)
5. Operation with loss of power? (Mains power loss, battery back-up, battery power loss, etc). Notification when power/battery failed.
6. Test the device for ligature performance and robustness (risk of access to cables, etc)

Test requirements:

- Multi-directional load
- Grades of weight to apply (3kg / 5kg / 10kg / 20kg) – clinical input
- Relation of circumference of cord to weight (suffocation c.f. internal damage)
- Verifying functionality (ie. testing for blind spots)
- Limitations of coverage highlighted (ie. full or partial width of door part referenced)
- System testing procedures or active fault detection systems - reliability

Loose furniture

Items found within a room or mental health environment that are not fixed in position. This might be a chair or a coffee table.

Forms of ligature with load:

1. Interaction with the room, can you trap an item of furniture between two fixed items (similar to fixed movable item) – between bed and wall or over the top of the door
2. Stacking to access 'out of reach' ligature points

3. Manipulation of furniture (cutting wedge into form) to create ligature, placed on bed for height
4. Low level anchor points for crocodile roll, wrapping around a chair

Test requirements:

- Multi-directional load
- Grades of weight to apply (3kg / 5kg / 10kg / 20kg) – clinical input
- Relation of circumference of cord to weight (suffocation c.f. internal damage)
- Testing before and after damage

Ligature tools

We've created a list of common tools to ensure we are creating tests that are representative of the real-life challenges within mental health environments. We have constrained this list to the items that are commonly found in mental health environments. Other tools could be smuggled in, so there is always a need for good check-in procedures to avoid this.

1. For creating ligature
    a. Bed sheets / clothing / hoody cord (range of thickness of fabric)
    b. Clothing hems (plastic inner)
    c. Mastic (standard) removed
    d. Knotted bed sheet (compressible anchor point)
    e. Phone charger cords or headphone cables
    f. Paperclips
    g. Window/door seals removed for ligatures
    h. Dental floss
    i. Plastic bags
    j. Shoelaces
    k. Belts/dressing gown cords
    l. Bras, including underwire
    m. Buttons with cord attached, bin lid with cord attached

2. For damaging products to create ligatures
    a. Zips being used to create slots
    b. Keys – either for bedroom door or locker keys
    c. Cutlery
    d. Physical damage (cracks in products, creating gaps between parts)
        i. Moveable products physical damage means may need to be considered in different way
        ii. Time considered for loud, audible physical damage before retest should be shorter as staff should respond, either by observing safely from outside the room, or intervention with sufficient support
    e. Broken CDs
    f. Stressed – fixings wiggled over time to loosen to create gap
    g. Wear over time

3. Testing before and after damage
    a. Tested as per manufacturer's requirements and guidelines (ie. undamaged)
    b. Sustained attack for (15/30/45mins) and then retested for ligature performance
        i. How to define whether a ligature point is achieved?
        ii. What attack is appropriate? (Has to be realistic)
        iii. Focus on silent attacks? Brutal/noisy attacks should alert staff and be intervened or observed

Got to consider the distortion of strength and pain thresholds due to medications/mental state ie. service user can use a key to cause the same damage that a test operative might need to use a screwdriver for.

Guidance points from ligature performance workshop

These were a series of notes recorded from the workshop that highlight points for consideration when selecting products and designing mental health environments. We have excluded these points from the testing regime to ensure the scope of the project is deliverable. We might develop some of these aspects into the formal testing and accreditation scheme in future.

Self-harm

- Can't eliminate as there are risks of intentional harm all around, example of corner of wall used to head-butt
- Where you might focus attention is compare specific points from different products to try and reduce risk, focusing on biggest/most obvious self-harm risks. Examples of this might sharp edges on beds or door hardware backplate, and protruding items ie. turn on vision panel
- All considerations here have to be carefully considered as to the impact on usability and ensuring the correct priorities are selected for the care pathway ie. dexterity issues for older age occupants

You can't have it all – how best to compromise for the right user group

- All products must be assessed in the overall context of the care pathway requirements – ie. elderly patient group need easy grip handles, with lower risk of ligature, or balancing risk against recovery ie. risk free room would be empty, but not aid recovery
- Changing care pathway during a building's life, estates/clinical staff will need to consider what products also need to change

Risk is a lowest common denominator, what about products interaction with each other?

- All products tested and assessed in isolation, however, important to understand that the ligature performance of the room will be based on the biggest risk in the room (one ligature risk is enough for a completed suicide)
- Carefully consider the placement of products relative to each other and ensure combinations of products do not create risks (eg. series of load release coat hooks placed together, and cord being wrapped up and over edges to secure load)
    - Future development: Test the entire room? Live tests (acoustic example)?
    - Or certified designers/installers?

Remember to test the product's core function

- Example of load release curtains that fall down with side load ie. when opening or closing of curtain
- Another example of load release coat hook not holding a dressing gown or wet towel that it's needed for

Ensuring correct installation and maintenance – MOTs for products?

- Would it help to get a statement from manufacturers on how often products need assessed, or maintained
- Could companies offer MOT for their products in MH? Essential for CQC to approve?

Load release – not suitable for all

- Weaponisation risk in aggressive environments, carefully consider what comes loose and whether this poses a greater risk than already exists ie. fist punch, kick or shoes
- Risk of slips, trips and falls with dementia users requires careful consideration when assessing load release products, ie. using an item for balance whilst walking, might create risk of falls and you might want to think carefully about how you manage the ligature risk
- Is it fit for its intended purpose (ie. a coat hook that doesn't hold a dressing gown)
- Risk of concealment in mechanism in forensic environments

Alarm systems

- Important that these are considered within overall operational procedure, ie. what happens when the alarm goes off?
- How often are the alarms tested?
- What if an alarm is switched off? How do other staff know? Risk of accidentally switching off?