The Use of Splints for Behavioural Control

Brent Hayward
Practice Advisor, Credentialed Mental Health Nurse
Office of the Senior Practitioner
Disability Services
Department of Human Services
Victoria, Australia
Introduction

• The Disability Act 2006 (Victoria) defines mechanical restraint as the use, for the primary purpose of behavioural control of a person with a disability, of devices to prevent, restrict or subdue a person’s movement but does not include the use of devices (a) for therapeutic purposes; (b) to enable the safe transportation of the person.

• A splint refers to any device that is applied or worn, in original or modified form; to a body joint (usually the elbow) which restricts movement of that joint in any way, for the purpose of controlling behaviour.

• Reductions in the use of mechanical restraint is a focus of the Office of the Senior Practitioner in 2010-2011.
Examples of Splints Reported in the Literature

- Babuccu et al. (2002)
- Bumin et al. (2002)
- Sharpe (1992)
- McClure & Holtz-Yotz (1991)
- Ball et al. (1985)
Introduction

• Historically been applied prevent self-injurious behaviour and minimise the injury that may result from SIB (Kahng et al., 2008; O'Rielly et al., 2003)

• Splints substantially compromises an individual’s quality of life and consequently warrants intervention (Oliver et al., 1998)

• The basis is response restriction (Canella et al., 2006) without introduction of alternative behaviour

• Do not address functional influences that may set the occasion for, or reinforce, the behaviour of concern (Luiselli & Waldstein, 1994)

• Minimal evidence about the efficacy of splints

• Physical and psychological health implications

• Human rights (Carter & Wheeler, 2005) and ethical considerations (Canella-Malone et al., 2008)
# Case Reports of Splint Use for Behavioural Control

<table>
<thead>
<tr>
<th>Author</th>
<th>Gender</th>
<th>Age</th>
<th>ID</th>
<th>Other Diagnoses</th>
<th>Behaviour</th>
<th>Function</th>
<th>Arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canella-Malone et al. (2008)</td>
<td>Male</td>
<td>10</td>
<td>Profound</td>
<td>Cerebral palsy, hydrocephalus</td>
<td>Hand-mouthing</td>
<td>Attention</td>
<td>Bilateral</td>
</tr>
<tr>
<td>Luiselli (1991)</td>
<td>Female</td>
<td>18</td>
<td>?</td>
<td>Down syndrome, seizures, vision impairment</td>
<td>Eye-pressing</td>
<td>Sensory</td>
<td>Bilateral</td>
</tr>
<tr>
<td>Yang (2003)</td>
<td>Female</td>
<td>14</td>
<td>Profound</td>
<td>Microcephaly</td>
<td>Scratching face</td>
<td>Attention</td>
<td>Bilateral</td>
</tr>
<tr>
<td>Irvin et al. (1998)</td>
<td>Female</td>
<td>25</td>
<td>Profound</td>
<td>?</td>
<td>Hand-mouthing</td>
<td>Non-social</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>41</td>
<td>Profound</td>
<td>?</td>
<td>Hand-mouthing</td>
<td>Non-social</td>
<td>?</td>
</tr>
<tr>
<td>Luiselli &amp; Waldstein (1994)</td>
<td>Female</td>
<td>10</td>
<td>Profound</td>
<td>Hydrocephalus, seizures, scoliosis, vision impairment</td>
<td>Hand-mouthing</td>
<td>Sensory</td>
<td>Left*</td>
</tr>
<tr>
<td>Favell et al. (1978)</td>
<td>Female</td>
<td>15</td>
<td>Profound</td>
<td>?</td>
<td>Eye poking, scratching</td>
<td>?</td>
<td>Bilateral</td>
</tr>
<tr>
<td>Johnson et al. (1994)</td>
<td>Male</td>
<td>7</td>
<td>Severe</td>
<td>ASD</td>
<td>Face punching, head-slapping</td>
<td>?</td>
<td>Bilateral</td>
</tr>
<tr>
<td>Ball et al. (1980)</td>
<td>Female</td>
<td>22</td>
<td>Profound</td>
<td>?</td>
<td>Finger sucking</td>
<td>?</td>
<td>Bilateral</td>
</tr>
<tr>
<td>O’Reilly et al. (2003)</td>
<td>Male</td>
<td>27</td>
<td>Profound</td>
<td>DS</td>
<td>Head-hitting</td>
<td>Sensory</td>
<td>Bilateral</td>
</tr>
<tr>
<td>Powers et al. (2007)</td>
<td>Female</td>
<td>16</td>
<td>Moderate</td>
<td>Cerebral degenerative chorea</td>
<td>Face punching</td>
<td>?</td>
<td>Bilateral</td>
</tr>
<tr>
<td>McClure &amp; Holtz-Yotz (1991)</td>
<td>Male</td>
<td>13</td>
<td>Severe</td>
<td>ASD</td>
<td>Pinching, biting, rubbing of face and body</td>
<td>Sensory</td>
<td>Bilateral</td>
</tr>
<tr>
<td>Oliver et al. (1998)</td>
<td>Female</td>
<td>25</td>
<td>Profound</td>
<td>Vision impairment, hearing impairment Down syndrome ?</td>
<td>Head punching Face slapping Face punching and hair pulling</td>
<td>?</td>
<td>Right</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>32</td>
<td>Severe</td>
<td>Vision impairment, Down syndrome</td>
<td>?</td>
<td>?</td>
<td>Bilateral</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>29</td>
<td>Severe</td>
<td>Vision impairment, Down syndrome</td>
<td>?</td>
<td>?</td>
<td>Bilateral</td>
</tr>
</tbody>
</table>
Splint use in Victorian Disability Services

- 13 questionnaires (12 x SIB)
- 6M (mean age = 27), 7F (mean age = 30)
- Average number of years splint used = 6
- 4 people also subject to chemical restraint
- 7 cerebral palsy, 6 vision impaired, 4 epilepsy
- Sensory Assessment = 3
- Communication assessment = 3 (non verbal = 8)
- Functional Behaviour Assessment = 2
- Behaviour Support Plan = 5
## Interventions for Self-Injurious Behaviour Associated with Splint Use

<table>
<thead>
<tr>
<th>Author</th>
<th>Gender</th>
<th>Age</th>
<th>Intervention Part 1</th>
<th>Intervention Part 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luiselli (1991)</td>
<td>Female</td>
<td>18</td>
<td>Fading of splints to mittens and then to gloves</td>
<td>Fading of glove by physical modification</td>
</tr>
<tr>
<td>Irvin et al. (1998)</td>
<td>Female</td>
<td>25/41</td>
<td>Measurement of response effort</td>
<td>Increase flexion of splint to allow adaptive behaviour</td>
</tr>
<tr>
<td>Luiselli &amp; Waldstein (1994)</td>
<td>Female</td>
<td>10</td>
<td>Oral-motor desensitisation</td>
<td>Response-contingent interruption (brief hands-down physical restraint)</td>
</tr>
<tr>
<td>Favell et al. (1978)</td>
<td>Female</td>
<td>15</td>
<td>(1) Fading by increasing periods out of restraints</td>
<td>Sensory activities</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>27</td>
<td>(2) Fading by increasing periods out of restraints</td>
<td>Firm pressure applied to arms by staff then faded</td>
</tr>
<tr>
<td>Johnson et al. (1994)</td>
<td>Male</td>
<td>7</td>
<td>Fading by increasing periods out of restraints</td>
<td>DRO (verbal praise and food) and brief hands-down physical restraint</td>
</tr>
<tr>
<td>Ball et al. (1980)</td>
<td>Female</td>
<td>22</td>
<td>Fading by reducing air pressure (sensor apparatus)</td>
<td>DRO using preferred food</td>
</tr>
<tr>
<td>Kahng et al. (2008)</td>
<td>Male</td>
<td>16</td>
<td>Only functional analysis</td>
<td></td>
</tr>
<tr>
<td>Lewis et al. (1981)</td>
<td>Male</td>
<td>10</td>
<td>Introduction of splint</td>
<td>Fading not completed</td>
</tr>
<tr>
<td>O'Reilly et al. (2003)</td>
<td>Male</td>
<td>27</td>
<td>Removal of splints</td>
<td>Vibration and sound activities</td>
</tr>
<tr>
<td>Powers et al. (2007)</td>
<td>Female</td>
<td>16</td>
<td>Splints maintained</td>
<td>Non-contingent access to preferred stimuli (toys)</td>
</tr>
<tr>
<td>McClure &amp; Holtz-Yotz (1991)</td>
<td>Male</td>
<td>13</td>
<td>Increased flexion of splints, fade to foam pads</td>
<td>Fade to elastic bandages, sensory activities</td>
</tr>
<tr>
<td>Ball et al. (1985)</td>
<td>Male</td>
<td>11</td>
<td>Introduction of flexible splints</td>
<td>“Positive reinforcement”</td>
</tr>
<tr>
<td>Oliver et al. (1998)</td>
<td>Female</td>
<td>25</td>
<td>(1) Fading by increasing flexion</td>
<td>(2) Reduction in the length of the splint</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>32</td>
<td>(2) Fading by increasing flexion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>29</td>
<td>(3) Fading by increasing flexion</td>
<td></td>
</tr>
</tbody>
</table>
Splint Use in Specific Populations

Rett’s Syndrome
• Contingent interruption superior to splinting (Paisley et al., 1993)
• Emergence of movements of the trunk and of teeth grinding (Bumin et al., 2003) and anxiety (Bumin et al., 2003)
• No lasting effect on stereotypic behaviour (Naganuma & Billingsley, 1988; Sharpe & Ottenbacher, 1990; Sharpe, 1992; Tuten & Miedaner, 1989)
• Benefits cannot be generalised to Rett’s syndrome population as a whole (Tuten & Miedaner, 1989)
• Isolated cases of improved hand skills using splints however these have also included intensive occupational therapy at the same time (Kubas, 1992)

Cleft Lip and Palate
• No consensus
• Distress to children and parents (Oxley, 2001)
• May contribute to motor weakness in children (O’Riain, 1977)

Other
• Restricted use of less-involved hands in cerebral palsy (Crocker et al., 1997)
• Constraint-induced movement therapy in hemiparesis (Dickerson & Brown, 2007)
• Wrist flexion contractures (Jordan et al., 1999)
The Problem with Splints: Behavioural Perspective

- Reduce the chance of other behavioural interventions and eliminates most sources of positive reinforcement (Paul & Romanczyk, 1973)
- Arm splints are often used as continuous restraint, which is not contingent on the behaviour of concern being exhibited (Matson & Boisjoli, 2009)
- They are aversive, punitive and intrusive (Yang, 2003)
- Loss of meaningful social relationships and personal autonomy (Obi, 1997)
- Reduced participation in ADLs and PCAS (Kahng et al., 2008)
- Restricted adaptive functioning (Irvin et al., 1998; Obi, 1997; Powers et al., 2007; Wallace et al., 1999)
- Limit benefit from therapeutic services (Fisher et al., 1997)
- Behaviours may be maintained by access to splints themselves (Kahng et al., 2008)
- Self-restraint may develop if splint is withheld (Oliver et al., 1998)
- Self-injury usually returns immediately when the splint is removed (O'Rielly et al., 2003)
Risks Associated with Splint Use

- Tissue breakdown (Ball et al., 1980; 1985)
- Impaired blood circulation (Ball et al., 1980; 1985)
- Dislocation of joints (Fisher et al., 1997)
- Muscle atrophy (Powers et al., 2007)
- Pressure sores (McClure & Holtz-Yotz, 1991)
- Restricted range of motion (Ball et al., 1985; Irvin et al. 1998)
- Skin irritation (Ball et al., 1980; Jordan et al., 1999)
- Abrasions (Ball et al., 1985)
- Motor weakness (Oxley, 2001)
- Bone demineralisation, shortening of tendons and arrested motor development (Lovass & Simmons, 1969)
- Soft tissue problems from larger arc of motion of shoulder (Cooper et al., 1993)
- Distress (Oxley, 2001) and agitation (Ofoegbu & Playfor, 2005)
- Delayed psychological development (Harris, 1996)
- Psychological injury (O’Riain, 1977) including PTSD (Ofoegbu & Playfor, 2005)
- Long-term risks for children are unknown (Effgen & McEwen, 2008)
Summary

- The type of behaviour, its severity, the length of time the splint has been used, the age of the person and their cognitive level may all be instrumental in determining treatment effectiveness (Gorman-Smith & Matson, 1985).

- There is a dearth of research concerning people with multiple disabilities who injure themselves severely through self-biting, chronic hand mouthing or interfering with open wounds or enteral feeding tubes who are at high risk of long-duration restraint (Sturmey, 1999).

- Measurement of response effort ensures the minimum amount of joint splinting required and maintains adaptive behaviour (Wallace et al., 1999; Zhou et al., 2000).

- Need to consider all possibilities for fading, either directly from the splint or with an intermediary device, for example, a glove (Luiselli, 1991) or wrist weights (Van Houten, 1993).

- People with severe and profound disabilities already have limited levels of adaptive ability which is dramatically compounded by the use of splints.

- … By eliminating restrictions, [people with disabilities] have a greater likelihood of acquiring meaningful skills, engaging purposefully with their surroundings, avoiding untoward physical effects and, as a result, experiencing a richer quality of life (Luiselli & Waldstein, 1994: 364).
Recommendations

1. Splints should **not** be the first-line intervention for self-injurious behaviours
2. Functional behaviour assessment or functional analysis must be undertaken with the splints **off**
3. Assessment of the person’s sensory preferences should be undertaken by an Occupational Therapist
4. The person must have a formal way of communicating as indicated by an assessment by a Speech Pathologist
5. A physical health basis for the onset of self-injurious behaviour should be excluded
6. Splints should only be used contingent on behaviours and should be based on measurement of response effort
7. There is no evidence for the standard use of splints in particular diagnostic groups (e.g. Rett’s, Lesch-Nyhan)
8. Standard behavioural interventions should be attempted - fading appears to be the most successful
9. Monitoring for exacerbation of existing health co-morbidities and the development of adverse health complications must be conducted regularly
10. Range of motion exercises on the splinted joint must be performed at least daily or as recommended by a clinician
References


References


