CPAP and NIV as palliative care and ethical issues.
WHO Definition of Palliative Care

Palliative care is an approach that improves the quality of life of patients and their families facing the problem associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual.
Pediatric Palliative Care Definition

Palliative care for children is the active total care of the child's body, mind and spirit, and also involves giving support to the family.

• It begins when illness is diagnosed, and continues regardless of whether or not a child receives treatment directed at the disease.

• Healthcare providers must evaluate and alleviate a child’s physical, psychological and social distress.

• Effective palliative care requires a broad multidisciplinary approach that includes the family and makes use of available community resources; it can be successfully implemented even if resources are limited.

• It can be provided in tertiary care facilities, in community health centers and even in children's homes.

Why palliative care for children is different from adult palliative care?

Size: the number of children dying is small

Rare Diseases

Transitional problems

Time scale of children’s illnesses

Many of the illnesses are familial

Care embraces the whole family

Continuing development: physical, emotional and cognitive

Provision of education and play when a child is sick is essential, and education is a legal entitlement.
**A care pathway approach**

**Diagnosis / recognition**
Every family should receive the disclosure of their child’s diagnosis in a face-to-face discussion in privacy and should be treated with respect, honesty and sensitivity. Information should be provided both for the child and family in a language that they can understand.

Every child and family diagnosed in the hospital setting should have an agreed transfer plan involving the hospital, community services and the family, and should be provided with the resources they require before leaving hospital.

**Living with the condition**
Every family should receive a multi-agency assessment of their needs as soon as possible after diagnosis or recognition and should have their needs reviewed at appropriate intervals.

Every child and family should have a multi-agency care plan agreed with them for the delivery of co-ordinated care and support to meet their individual needs. A key worker to assist with this should be identified and agreed with the family.

**End of life care**
Every child and family should be helped to decide on an end of life plan and should be provided with care and support to achieve this as closely as possible.

**Bereavement care**
Bereavement support should be provided throughout the care pathway and continue through the child’s death and beyond.

---

**Relationship between palliative care and treatments aimed at cure or prolonging life**

As the illness progresses the emphasis gradually shifts from curative to palliative treatment.

Highly technical invasive treatments may be used both to prolong life and improve quality alongside palliative care, each becoming dominant at different stages of the disease.

No cure is possible and care is palliative from the time of diagnosis.

At first it is not apparent that this will be a terminal illness and palliative care starts suddenly once that realisation dawns.
Terminal Illness ??

**Life-limiting illness** is defined as a condition where premature death is usual, (i.e. Duchenne muscular dystrophy, CF)

**Life-threatening illness** is one where there is a high probability of premature death due to severe illness, but there is also a chance of longterm survival to adulthood (i.e. Cancer, organ failure)

**End of life** is the period before death during which the clinical condition is severely compromised and changes in vital signs indicate that death is imminent.

EUROPEAN JOURNAL OF PALLIATIVE CARE, 2007; 14(3)
Categories of life-limiting and life-threatening conditions

Category 1
Life-threatening conditions for which curative treatment may be feasible but can fail. On reaching long term remission or following successful curative treatment there is no longer a need for palliative care services. Examples: cancer, irreversible organ failures of heart, liver, kidney.

Category 2
Conditions where premature death is inevitable, where there may be long periods of intensive treatment aimed at prolonging life and allowing participation in normal activities. Examples: cystic fibrosis, Duchenne muscular dystrophy.

Category 3
Progressive conditions without curative treatment options, where treatment is exclusively palliative and may commonly extend over many years. Examples: Ceroid lipofuscinosis, mucopolysaccharidoses.

Category 4
Irreversible but non-progressive conditions causing severe disability leading to susceptibility to health complications and likelihood of premature death. Examples: severe cerebral palsy, multiple disabilities such as following brain or spinal cord injury, complex health care needs and a high risk of an unpredictable life-threatening event or episode.
Case series OPBG Roma 437 patients in PLTV
344 in NIV
End stage respiratory failure

Discussions about prognosis and how far treatment should go in the event of deterioration should take place in every progressive NMD, with active involvement of patient and family.

There is no consensus about treatment of end stage respiratory failure, regarding to suspend/prolong NIV, use of opioids and psychotropic medication and non-drug management of dyspnea and other symptoms.

Table 1. Characteristics of patient and carer participants.

<table>
<thead>
<tr>
<th>Patient age</th>
<th>Site of onset</th>
<th>Level of use (regular: &gt;4 h; low: ≤4 h)</th>
<th>Family carer</th>
<th>Survival from initiation on NIV</th>
<th>End-of-life circumstances</th>
</tr>
</thead>
<tbody>
<tr>
<td>60+</td>
<td>Limb</td>
<td>Regular user</td>
<td>Wife</td>
<td>20 months</td>
<td>24-h use, died out of hospital with NIV mask on</td>
</tr>
<tr>
<td>70+</td>
<td>Limb</td>
<td>Low user</td>
<td>Husband</td>
<td>1 month</td>
<td>Died in hospital, low user, not using at the time of death</td>
</tr>
<tr>
<td>70+</td>
<td>Limb</td>
<td>Regular user</td>
<td>Husband</td>
<td>19 months</td>
<td>24-h use, died at home with NIV mask on</td>
</tr>
<tr>
<td>60+</td>
<td>Limb</td>
<td>Regular user</td>
<td>Wife</td>
<td>19 months</td>
<td>24-h use, died at home with NIV mask on</td>
</tr>
<tr>
<td>60+</td>
<td>Bulbar</td>
<td>Regular user</td>
<td>Husband</td>
<td>10 months</td>
<td>Died in hospital, had stopped using 1 month prior due to physical deterioration</td>
</tr>
<tr>
<td>70+</td>
<td>Respiratory</td>
<td>Regular user</td>
<td>Wife</td>
<td>23 months</td>
<td>24-h use, died at home with NIV mask on</td>
</tr>
<tr>
<td>70+</td>
<td>Limb</td>
<td>Regular user</td>
<td>Wife</td>
<td>3 months</td>
<td>Died in hospital, regular user; some use at night in hospital, not using during daytime when died</td>
</tr>
<tr>
<td>60+</td>
<td>Bulbar</td>
<td>Low user</td>
<td>Non-participant wife</td>
<td>6 months</td>
<td>Low user, not using around the time of death</td>
</tr>
<tr>
<td>70+</td>
<td>Limb</td>
<td>Low user</td>
<td>Daughter</td>
<td>6 months</td>
<td>Low user, had stopped using around the time of death</td>
</tr>
<tr>
<td>60+</td>
<td>Limb</td>
<td>Regular user</td>
<td>Wife</td>
<td>3 months</td>
<td>24-h use, died at home with NIV mask on with oxygen</td>
</tr>
</tbody>
</table>

NIV: non-invasive ventilation.
Conclusions

This study suggests that use of NIV does not have a detrimental impact on end of life for patients with MND and was reported to be beneficial by many participants. It highlights variation in wishes regarding usage among patients towards the final phase and the need to ensure that carers are fully aware of how the system functions. The results of this study confirm the importance of disseminating the end-of-life wishes and advance directives.
Results: Of the 20 records studied, all died in hospital. Only 15% of patients had a do-not-resuscitate order agreed to more than 1 week prior to death. Opioids were prescribed for 1 patient (5%) at 1 week prior to death, increasing to 85% of patients in the last 24 hours of life. During the last 24 hours of life, intravenous antibiotics continued in 85%, and assisted ventilation in 90% of subjects.

Conclusion: We conclude that the circumstances surrounding the death of patients with CF holds challenges for their effective palliative care. CF patients continue life prolonging and preventative treatments until the last hours of life.
Conclusions:
Legal, ethical and practical guidance is needed for professionals who support a patient with MND who wishes to withdraw from ventilation. Open discussion of the ethical challenges is needed as well as education and support for professionals.
Management strategies in pediatric dyspnea in the palliative context

**Palliation of Dyspnea in pediatrics**

**Walter M Robinson**

For mild dyspnea, psychological and behavioral interventions

For patients with obvious hypoxemia, institution of supplemental oxygen is advised

For those with moderate dyspnea, treatment modalities can be added including noninvasive positive pressure ventilation either by means of Continuous Positive Airway Pressure (CPAP) or Bi-Level Positive Airway Pressure (BiPAP), depending on the child’s clinical condition.

Airway clearance techniques

Chronic negative pressure ventilation using a cuirass

Chronic positive pressure ventilation using tracheostomy

Pharmacological interventions for dyspnea in children are similar to those in adults. Opioids are the cornerstone of therapy
Spinal Muscular Atrophy (SMA)

Spinal cord motor neurons disease resulting in progressive muscular atrophy and weakness. (1:6,000 - 1:10,000)

Recessive autosomic inherited disease: 1/50 is a healthy carrier of the gene

Gene SMN identified on the long arm of chromosome 5 in the region 5q13, exon 7 – 8 “Survival Motor Neurons Protein”.

R. Cutrera, 2016, cutrera@opbg.net
Spinal Muscular Atrophy (SMA)

The clinical spectrum of SMA ranges from early infant death to normal adult life with only mild weakness. SMA clinically divided into:

- **Type I:** is never sitting, 50% mortality at 7ms, 100% at 2-yrs of age
- **Type II:** sitting position, never walk, respiratory failure in childhood
- **Type III:** temporarily able to walk, With intervals of 0.1
- **Type IV:** adulthood
MUSCLE WEAKNESS EFFECTS

1. Impaired swallowing and GERD
2. Chest wall deformity
3. Lung under development
4. Impaired cough resulting in poor clearance of lower airway secretions
5. Recurrent infections that exacerbate muscle weakness
6. Hypoventilation (sleep awake) and Sleep Disordered Breathing
Outcome of goal-directed non-invasive ventilation and mechanical insufflation/exsufflation in spinal muscular atrophy type I

M Chatwin, A Bush, A K Simonds
Arch Dis Child 2011;96:426–432

Design A descriptive study of interventions and investigations is reported that were offered to a cohort of 13 children with SMA type I referred to our centre.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Resuscitation status: for intubation and ventilation?</th>
<th>Total number of intubations</th>
<th>Referred for management to facilitate discharge</th>
<th>Non protocol-led extubation success</th>
<th>Protocol-led extubation success</th>
<th>Admissions managed with non-invasive aids</th>
<th>Home mechanical insufflation/exsufflation?</th>
<th>NIPPV use at discharge after initiation</th>
<th>NIPPV use at present or before death</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Y</td>
<td>3</td>
<td>Y</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>Y</td>
<td>Nocturnally</td>
<td>Nocturnally</td>
</tr>
<tr>
<td>B</td>
<td>Y</td>
<td>1</td>
<td>Y</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Y</td>
<td>Nocturnally</td>
<td>24 h a day</td>
</tr>
<tr>
<td>C</td>
<td>N</td>
<td>0</td>
<td>Y</td>
<td>NA</td>
<td>NA</td>
<td>0</td>
<td>N</td>
<td>18 h a day</td>
<td>24 h a day</td>
</tr>
<tr>
<td>D</td>
<td>Y</td>
<td>2</td>
<td>N</td>
<td>0</td>
<td>Not attempted</td>
<td>0</td>
<td>N</td>
<td>Acclimatisation to NIPPV</td>
<td>Nocturnally</td>
</tr>
<tr>
<td>E</td>
<td>Y</td>
<td>0</td>
<td>Y</td>
<td>NA</td>
<td>NA</td>
<td>2</td>
<td>Y</td>
<td>18 h per day</td>
<td>16 h per day</td>
</tr>
<tr>
<td>F</td>
<td>Y</td>
<td>0</td>
<td>N</td>
<td>NA</td>
<td>NA</td>
<td>2</td>
<td>Y</td>
<td>Acclimatisation to NIPPV</td>
<td>Nocturnally</td>
</tr>
<tr>
<td>G</td>
<td>Y</td>
<td>2</td>
<td>Y</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>Y</td>
<td>Nocturnally</td>
<td>Nocturnally</td>
</tr>
<tr>
<td>H</td>
<td>N</td>
<td>0</td>
<td>N</td>
<td>NA</td>
<td>NA</td>
<td>0</td>
<td>N</td>
<td>Nocturnally</td>
<td>23 h per day</td>
</tr>
<tr>
<td>I</td>
<td>Y</td>
<td>2</td>
<td>N</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Y</td>
<td>Nocturnally</td>
<td>16 h per day</td>
</tr>
<tr>
<td>J</td>
<td>Y</td>
<td>2</td>
<td>N</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>N</td>
<td>When unwell with a respiratory tract infection</td>
<td>Nocturnally</td>
</tr>
<tr>
<td>K</td>
<td>N</td>
<td>0</td>
<td>N</td>
<td>NA</td>
<td>NA</td>
<td>1</td>
<td>Y</td>
<td>18 h a day</td>
<td>20 h per day</td>
</tr>
<tr>
<td>L</td>
<td>Y</td>
<td>1</td>
<td>N</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>N</td>
<td>Acclimatisation to NIPPV</td>
<td>Nocturnally</td>
</tr>
<tr>
<td>M</td>
<td>Y</td>
<td>4</td>
<td>Y</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>Y</td>
<td>Nocturnally</td>
<td>Nocturnally</td>
</tr>
</tbody>
</table>

N, no; NA, not applicable; NIPPV, non-invasive positive pressure ventilation; Y, yes.
The goal-targeted approach of using NIPPV predominantly to control symptoms and facilitate care at home has meant that parents are offered an informed choice about the management of their child.

We are not aware of other centres in the UK successfully using NIPPV to palliate respiratory symptoms in children with SMA type I who present at a very early age or in those who present after invasive ventilation after acute respiratory decompensation.

We have also shown that this intervention has enabled infants with early presentation of SMA type I to be discharged home from hospital to have quality time in their home with their families. This provides the family with choices and may assist them in coming to terms with the terminal diagnosis.

In our group of patients with later presentation, we also found improved survival, so it is notable that in some cases, NIPPV can ameliorate symptoms while at the same time extending life.

R. Cutrera, 2016, cutrera@opbg.net
CHEST WALL DEFORMITY

NORMAL
Bell-shaped chest

SMA
Outcome of goal-directed non-invasive ventilation and mechanical insufflation/exsufflation in spinal muscular atrophy type I

M Chatwin, A Bush, A K Simonds

Arch Dis Child 2011;96:426–432. doi:10.1136/adc.2009.177832
**Spinal Muscular Atrophy Type 1: Management and Outcomes**

*Bach JR, Baird S, Plosky D, Navado J, Weaver B*

*Pediatric Pulmonology 34:16–22 (2002)*

**Summary.** Our objectives were to describe survival, hospitalization, speech, and outcomes related to respiratory needs for spinal muscular atrophy type 1 (SMA1) patients, using noninvasive or tracheostomy ventilation. From 65 SMA patients referred to our clinic since 1996, we chose 56 SMA1 patients who developed respiratory failure before age 2 years. Patients either had tracheostomy tubes (group A), or used noninvasive ventilation and assisted coughing; a previously reported extubation protocol (group B) was used as needed.

Sixteen patients underwent tracheostomy at 10.8 ± 5.0 months of age, 33 were in group B, and 7 others died without life-support interventions. Compared to group B, group A patients had fewer hospitalizations until age 3 years, but more after age 5, and 15 of 16 lost all spontaneous breathing tolerance posttracheostomy and could not speak. One group A patient died at 16 months of age, and the others were 73.8 ± 57 months of age (the oldest was 19 years old). Two group B patients died at 6 and 13 months, respectively, whereas the other 31 were 41.8 ± 26.0 months (and up to 8.3 years) old. Three of 31 in group B required high-span positive inspiratory pressure plus positive end-expiratory pressure (PIP + PEPEI) continuously with minimal tolerance for breathing on their own, and 4 could not communicate verbally.

In conclusion, SMA type 1 children can survive beyond 2 years of age when offered tracheostomy or noninvasive respiratory support. The latter is associated with fewer hospitalizations after age 5 years, freedom from daytime ventillator use, and the ability to speak. *Pediatr Pulmonol. 2002; 34:16–22.* © 2002 Wiley-Liss, Inc.
A retrospective chart review of 194 SMA 1 (103 males, 91 females) patients’ outcomes has been carried out:

1. letting nature take its course (NT) 121 (62.3%),
2. tracheostomy and invasive mechanical ventilation (TV) 42 (21.7%)
3. continuous noninvasive respiratory muscles aid (NRA) including non invasive ventilation (NIV) and mechanical assisted cough (MAC) 42 (21.7%)
Multicentric study of medical care and practices in spinal muscular atrophy type 1 over two 10-year periods


Desguerre A. Archives de Pédiatrie 2014;21(3):347-354

<table>
<thead>
<tr>
<th>Tableau 1</th>
<th>Histoire de la maladie et prise en charge.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1989-1998 (n = 106)</td>
</tr>
<tr>
<td>Age au diagnostic</td>
<td>3 mois (96) [0.5-7]</td>
</tr>
<tr>
<td>Délai dg/premier signe</td>
<td>Non documenté</td>
</tr>
<tr>
<td>Age au premier signe</td>
<td>Non documenté</td>
</tr>
<tr>
<td>Kinésithérapie motrice</td>
<td>Non documenté</td>
</tr>
<tr>
<td>Kinésithérapie respiratoire</td>
<td>Non documenté</td>
</tr>
<tr>
<td>Installations/orthèses</td>
<td>28 (26 %)</td>
</tr>
<tr>
<td>Nutrition sur sonde naso-gastrique</td>
<td>36 (34 %)</td>
</tr>
<tr>
<td>Gastrostomie</td>
<td>2 (1.8 %)</td>
</tr>
<tr>
<td>Aspiration</td>
<td>44 (41 %)</td>
</tr>
<tr>
<td>Oxygénothérapie</td>
<td>Non documenté</td>
</tr>
<tr>
<td>VNI</td>
<td>0</td>
</tr>
<tr>
<td>Lieu du décès inconnu</td>
<td>26</td>
</tr>
<tr>
<td>Décès hôpital</td>
<td>44 (45 %)</td>
</tr>
<tr>
<td>Décès réanimation</td>
<td>11 (10 %)</td>
</tr>
<tr>
<td>Décès domicile</td>
<td>18 (17 %)</td>
</tr>
<tr>
<td>Analgésie (niveau 2 ou 3)</td>
<td>15 (18 %)</td>
</tr>
</tbody>
</table>

Les variables continues sont exprimées en médiane, les effets fictifs étant entre parenthèses et en Italie et les valeurs extrêmes entre crochets [ ]. Les variables discontinues sont exprimées en nombre et pourcentage entre parenthèses. VNI (ventilation non invasive) ; dg (diagnostic) ; NS : non significatif.
Summary of pulmonary problems and respiratory interventions in spinal muscular atrophy.
Fig. 2. Management pathway in SMA1 at diagnosis and at follow-up. Consensus summary of cough-assisted techniques and timing according to age in SMA II patients. NIV = non invasive ventilation; IV = invasive ventilation; MI-E = mechanical in-exsufflator.
CME ARTICLE

The use of mechanical ventilation is appropriate in children with genetically proven spinal muscular atrophy type I: the motion for

John R. Bach*

Department of Physical Medicine and Rehabilitation, UMDNJ-New Jersey Medical School, Newark, NJ, USA

REVIEW

The use of invasive ventilation is appropriate in children with genetically proven spinal muscular atrophy type I: the motion against

Monique M. Ryan*

Neurosciences Department, Royal Children's Hospital and Murdoch Children's Research Institute, Melbourne, Australia
When professionals assess the resulting life for the child and family, they sometimes fear it will result in unreasonably excessive care. The aim of this article is to present an analysis of ethical arguments that could support or oppose the provision of invasive ventilation in this population. This examination is particularly relevant as France is one of the few countries performing tracheotomies and mechanical ventilation for this condition.

NIV is ineffective and contraindicated in infants who have severe bulbar weakness, usually present in babies with severe type 1 SMA.

The consensus of expert opinion is that once the diagnosis has been confirmed invasive ventilation is not appropriate for infants with severe type 1 SMA.

Implementation of “the consensus statement for the standard of care in spinal muscular atrophy” when applied to infants with severe type 1 SMA in the UK

H Roper,1 R Quinlivan2 on behalf of Workshop Participants

## Status of therapeutic development in spinal muscular atrophy

<table>
<thead>
<tr>
<th>Therapeutic targets</th>
<th>Approaches</th>
<th>Clinical trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase SMN transcript</td>
<td>Histone deacetylase inhibitors</td>
<td>Valproic acid, sodium 4-phenylbutyrate</td>
</tr>
<tr>
<td></td>
<td>Nonhistone deacetylase inhibitors</td>
<td>Hydroxyurea</td>
</tr>
<tr>
<td></td>
<td>Quinazoline</td>
<td>Repligen RG3039</td>
</tr>
<tr>
<td></td>
<td>Prolactin</td>
<td></td>
</tr>
<tr>
<td>SMN2 exon 7 inclusion</td>
<td>Antisense oligonucleotides</td>
<td>ISIS-SMNRx</td>
</tr>
<tr>
<td>Stabilization of SMN protein</td>
<td>Aminoglycoside</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proteasome inhibitors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indoprofen</td>
<td></td>
</tr>
<tr>
<td>Neuroprotection</td>
<td>Neurotrophic factors</td>
<td>Riluzole, Gabapentin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Olesoxime (TRO19622)</td>
</tr>
<tr>
<td>Cell therapy</td>
<td>Stem cells</td>
<td></td>
</tr>
<tr>
<td>Replacement of SMN1</td>
<td>Gene therapy</td>
<td></td>
</tr>
</tbody>
</table>
**PROTOCOL TITLE:** An Open-Label Study to Assess the Efficacy, Safety, Tolerability, and Pharmacokinetics of Multiple Doses of ISIS 396443 Delivered Intrathecally to Subjects With Genetically Diagnosed and Presymptomatic Spinal Muscular Atrophy

This is a Phase 2, open-label, multicenter, multinational, single-arm study to assess the efficacy, safety, tolerability, and PK of multiple doses of ISIS 396443 in subjects with genetically diagnosed and presymptomatic SMA. All subjects will receive ISIS 396443 at 1 dose level, which will be administered as intrathecal injections by lumbar puncture.

R. Cutrera, 2015, cutrera@opbg.net
Consensus Statement for Standard of Care in Spinal Muscular Atrophy

R. Cutrera, 2016, cutrera@opbg.net
SMA1 - 85 pts (2002-2016)

- 85 pts (38 M ; 47 F)

-28 alive:
  - 18 invasive ventilation
    (tracheo age 14.9 ± 13.7 m.; age: 99.5 ± 58.2 m.)
  - 10 in NIV:
    (NIV starting age 8.5 ± 3.4 m.; age 39.3 ± 18.7 m.)

- 57 dead
  27 no LTV death age 7.94 ± 4.2 m.
    - 2 of them were discharged with Non invasive ventilation at home
      (NIV starting age 2.77 ± 0.7 m.; death age 8.7 ± 8.8 m.)
  28 NIV starting age 6.42 ± 4.89 m.; death age 12.44 ± 11.18 m.
    2 tracheo age 17.4 ; death age 48.8 ± 4.0 m.
SMA2 - 55 pts (2002-2016)

- 53 pts (30 M ; 23 F)

- 52 alive: mean age 166.117 ± 187.95 m.

23 in therapeutic NIV
1 invasive ventilation (tracheo)
26 spontaneous breathing

- 1 dead:
case 1 NIV at 19,07 mts, death at 36 mts;

- 2 lost at follow up

Average age at diagnosis 17 months
Average age at NIV 56,56 ± 46,41 mts

R. Cutrera 2016 - cutrera@opbg.net
Take Home Messages

- Pediatric Palliative care are different from adult palliation
- Non-invasive ventilation is an expanding palliative or therapeutical option in these patients.
- Most of our ventilated patients are in palliative conditions
- NIV is used in life end stage but there are not protocols and clear recommendations
- In SMA type 1 therapeutic possibilities of support are possible pending gene therapy and/or new drugs.
- Care to these children closely involved both professionally and personally