Practical selection of neonatal resuscitators

Southern African Development Community

A field guide
June 2010
Cover photo: David Jacobs
Neonatal Resuscitators

PATH conducted a market study in 2008 to identify neonatal resuscitators available in the Southern African Development Community (SADC) region.* These resuscitators are included in this region-specific version of the Practical Selection of Neonatal Resuscitators: A Field Guide. All resuscitators identified were bag-and-mask designs. We have also included two devices that offer a tube-and-mask design. This guide presents about the criteria used during the device evaluation, evaluation results for each device, and suggestions for choosing a resuscitator.

Importance of Resuscitation

Birth asphyxia refers to the condition when a baby does not breathe at birth. Asphyxia is estimated to account for one-third of the estimated 4 million neonatal deaths that occur annually. This results in over 1 million neonatal deaths and an unknown number of infants with long-term neurological disability. Reducing birth asphyxia and neonatal death requires appropriate care including a resuscitator available at every birth.

Neonatal resuscitators, when properly used, can lower the incidence of mortality associated with neonatal asphyxia. In order to achieve this, resuscitators need to be made available to all birth attendants in conjunction with adequate training.

Mechanics of Resuscitation

Newborn resuscitation should begin as soon as asphyxia is identified. After clearing the airway and correctly positioning the newborn’s head and neck, the health worker positions the mask over the mouth and nose and holds it with light pressure to form an airtight seal. Breaths should then be delivered at a rate of 40–60 breaths per minute. While it may be

* As of June 2010, SADC member states include Angola, Botswana, the Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, United Republic of Tanzania, Zambia, and Zimbabwe.
uncommon to have an in-line manometer (pressure gauge), caregivers should observe the infant's chest to ensure chest rise with each breath. Typical pressures may exceed 30 cm H₂O for the initial breath and then typically diminish to 15–20 cm H₂O. Tidal volumes are small, typically 5–8 ml/kg of newborn weight.†

How to Choose a Resuscitator‡

✔ Choose desired features
Features on most resuscitator models are similar, but variation exists. Depending on your program, features such as oxygen ports and reservoirs, high-quality packaging, or a compact profile may be important.

✔ Choose bag and mask or tube and mask
Both types of resuscitators can reduce the incidence of neonatal mortality, but each has distinct advantages and disadvantages. The Republic of South Africa does not include the use of tube-and-mask devices in their current guidelines.

✔ Decide between disposable and reusable
Depending on the nature of your program and the rate of neonatal asphyxia, single-use or multiuse resuscitators may be more cost-effective. If the environment of use indicates that resuscitators will always be reused, it may be advisable to invest in a multiuse resuscitator to permit correct cleaning and disinfection after use.

† This section provides a brief overview of a resuscitation procedure but is not meant to be a substitute for proper training. More information can be found online at www.helpingbabiesbreathe.org, www.aap.org/nrp/, and www.ilcor.org.

‡ The Adcock Ingram resuscitator is a single-use device available in South Africa, but it was not included in this guide because does not meet international standards for resuscitators. Additionally, its mode of operation is different from other resuscitators and therefore does not contain standard components (e.g., valve to prevent rebreathing of exhaled carbon dioxide). Special training should accompany this resuscitator if integrated into resuscitation programs.
Decide on a price range.

Resuscitators are now available from a wide variety of manufacturers and can vary widely in price despite having many of the same features. Resuscitators manufactured in the United States or Europe are often higher priced than similar resuscitators manufactured in other countries. The resuscitators in this field guide are divided into resuscitators costing under US$30 and over US$30.

Single-Use vs. Multiuse Resuscitators

**Single-use** (disposable) resuscitators can be lower priced than similar reusable models. However, single-use resuscitators are often manufactured with lower cost materials that cannot be reprocessed and are often sealed to prevent disassembly. Single-use models are not included in this guide.

**Multiuse** (reusable) resuscitators are often higher priced than similar disposable models. Reusable resuscitators are typically designed for both disassembly and reprocessing (including autoclaving). Due to the possibility of reuse, the cost per use of multiuse resuscitators may be lower than similar single-use resuscitators.

Important Features for Safe and Proper Resuscitation

Properly Sized and Form-Fitting Mask

Proper resuscitation depends on a good seal between the resuscitator and the neonate. Resuscitators are equipped with a variety of mask types including air-filled anatomically shaped masks or round, one- or two-piece masks (with a silicone flange). Resuscitators generally include one mask size for normal birthweight neonates. Purchasers will want to procure an additional mask for low-birthweight neonates for each resuscitator.

Pressure-Relief Valve

Preventing lung damage is a paramount concern for anyone performing resuscitations. A pressure-relief
Valve is designed to limit the pressure that the resuscitator can deliver. All bag-and-mask resuscitator models tested had a relief valve except the Blue Cross resuscitator. Note: Many of the models evaluated lacked any indication regarding the position of the valve—enabling the user to disable the relief valve without their knowledge.

**Minimal Dead Airspace**

Resuscitators that minimize dead airspace between the neonate’s face and the non-rebreathing valve prevent the neonate from rebreathing expelled air with a higher concentration of CO₂. Note: Dead airspace volume was not determined during this evaluation.

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**Critical decision**

**Bag and Mask**

**Pros**
- Pressure-limiting valve on most models reduces risk of lung rupture.
- More familiarity on part of providers.
- Wider variety on the market.

**Cons**
- Higher cost.
- More parts.
Designed for Assembly/Disassembly

Rridged surfaces on parts that disassemble help identify these parts to the user as well as make the resuscitator easier to disassemble with wet hands. Color coding can help users distinguish different components, and quality design can augment the ease of assembly and disassembly.

Properly Sized Bag
(bag and mask only)

A bag specifically designed for providing appropriate tidal volumes for neonates can help reduce errors during use and simplify training. Most bag-and-mask models had bags that evaluators felt were appropriately sized.

Which is right for your program?

Tube and Mask

Pros

• Often lower cost than bag-and-mask devices.
• Users may feel greater control delivering the pressure and monitoring the neonate’s progress.
• Fewer parts.

Cons

• Fatiguing to use.
• Users may need additional training and practice to provide proper and consistent resuscitation.
• Caregiver cannot give instructions or counseling during resuscitation.
Standard Mask Connections

Standard-sized connections are important to ensure compatibility with replacement components and masks from other manufacturers. Standard connections are a 15-mm inner diameter and a 22-mm outer diameter mask connector. Similarly, mask stems should have a 15-mm outer diameter or 22-mm inner diameter.

Guide to the Device Comparison Tables (pp. 9–21)

For each of the devices, the following information is provided in order to assist the reader in making an informed choice when purchasing a neonatal resuscitator. More information about specific resuscitators may also be available from the individual manufacturer or distributor.

The ASTM standard used as the basis for several evaluations is F920-93 Standard Specifications for Minimum Performance and Safety Requirements for Resuscitators Intended for Use with Humans.

Device Information

This section provides basic information on model, supplier, website (for additional information), and cost (as of December 2009).

Features That Count

This section provides information on features that have been identified as particularly important in resuscitator selection.

- **Mask size**: Size of mask(s) included with resuscitator.

- **Mask type**: Type of mask included with resuscitator.

- **Properly sized bag**: Based on user input and international guidelines.
• **Pressure-relief valve/position indication:** More information on proper valve operation can be found in the Laboratory Evaluations section (see pg. 7).

• **Designed for assembly/disassembly:** Whether the resuscitator was designed to facilitate assembly and disassembly.

• **Standard mask connections:** Whether the resuscitator has standard mask connections that will permit it to be used with masks from other manufacturers or differently sized masks (e.g., normal neonate, low-birthweight neonate).

**Device Features**

This section provides information on:

• **Components:** Extra components included with the resuscitator.

• **Features:** Additional features of the resuscitator that are not required for basic operation.

• **Packaging:** Description of resuscitator packaging.

• **Single-use/multiuse:** Whether the resuscitator is designated by the manufacturer for single or multiple uses.

**Laboratory Evaluations**

This section provides information from laboratory testing on:

• **Pressure-limiting valve:** The pressure recorded at the patient connection port when air at a flow rate of 15 L per minute was passed through the resuscitator (per American Society for Testing and Materials standards). This test evaluates the proper function of the pressure-limiting valve in relation to the manufacturer’s designation.

• **Cleaning–effectiveness:** Evaluated by introducing blood into the device via the face mask, allowing the resuscitator to dry for one hour, and cleaning the resuscitator in a detergent solution using a soft-bristled brush. Score is based on the amount of blood remaining on the device after one minute of cleaning.
Disinfection–device durability: Disassembled resuscitators were submerged in a 0.5% chlorine solution for 48 hours and evaluated for damage. No microbiological evaluation was conducted to determine the degree of disinfection.

Instructions–completeness: Instructions included with the resuscitators were evaluated for completeness based on complete and correct information, accompanying diagrams, technical information, and reuse instructions.

Instructions–ease of reading: Instructions were evaluated using a Flesch Reading Ease score, a method based on the length of words and sentences. Flesch scores are assigned a grade level as follows: Very difficult—post graduate; Difficult—college; fairly difficult—high school; Standard—8th to 9th grade; Fairly easy—7th grade; Easy—5th to 6th grade; Very easy—4th to 5th grade.

Usability

Ease of use/comfort: Describes the ability of the user to intuitively adopt correct and consistent use of the resuscitator.

Disassembly/reassembly: Describes the ease and completeness of disassembly and reassembly by users without written instructions.

Device ergonomics: Describes an ergonomic analysis of the resuscitators as performed by the evaluation team. This includes size of device in relation to hand size, features to improve comfort or usability, and interaction of users with the device.
Devices Under US$30
<table>
<thead>
<tr>
<th>Device Information</th>
<th>Model Number</th>
<th>BE2303 Infant resuscitator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier</td>
<td>East Coast Medical Equipment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>80 Clark Road</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glenwood</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Durban 4001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>South Africa</td>
<td></td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.besmed.com">www.besmed.com</a></td>
<td></td>
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<td>Cost (as purchased)</td>
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<table>
<thead>
<tr>
<th>Features That Count</th>
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<tbody>
<tr>
<td>Mask size</td>
<td>Neonate (0/1)</td>
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<tr>
<td>Mask type</td>
<td>Round one-piece silicone</td>
</tr>
<tr>
<td>Properly sized bag</td>
<td>Yes</td>
</tr>
<tr>
<td>Pressure-relief valve/position indication</td>
<td>Yes/no</td>
</tr>
<tr>
<td>Designed for assembly/disassembly</td>
<td>Yes</td>
</tr>
<tr>
<td>Standard mask connections</td>
<td>Yes</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Device Features</th>
<th>Components</th>
<th>Oxygen reservoir bag; Oxygen tubing connector</th>
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</thead>
<tbody>
<tr>
<td>Features</td>
<td>Pressure-limiting valve</td>
<td></td>
</tr>
<tr>
<td>Packaging</td>
<td>Plastic bag, Optional plastic box.</td>
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<td>Single-use/multiuse</td>
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<table>
<thead>
<tr>
<th>Laboratory Evaluations</th>
<th>Pressure-limiting valve (@ 15 L/min air flow)</th>
<th>40 cm H₂O</th>
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<tbody>
<tr>
<td>Cleaning—effectiveness</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Disinfection—device durability</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Instructions—completeness</td>
<td>2</td>
<td></td>
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<td>Instructions—ease of reading</td>
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<table>
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<th>Ease of use/comfort</th>
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<tr>
<td></td>
<td>Disassembly/reassembly</td>
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<td>Device ergonomics</td>
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<td>OK</td>
<td>Fair</td>
<td>Poor</td>
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### Device Information

<table>
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<th>Feature</th>
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<tr>
<td>Supplier</td>
<td>Palmed Medical and Surgical Supplies</td>
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<tr>
<td></td>
<td>4 Clubhouse Place, Westmead, South Africa</td>
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<tr>
<td>Website</td>
<td><a href="http://www.headstarmedical.com">www.headstarmedical.com</a></td>
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<td>Cost (as purchased)</td>
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### Features That Count

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<tr>
<td>Mask size</td>
<td>Normal birth weight neonate</td>
</tr>
<tr>
<td>Mask type</td>
<td>Round one-piece silicone</td>
</tr>
<tr>
<td>Properly sized bag</td>
<td>Yes</td>
</tr>
<tr>
<td>Pressure-relief valve/position indication</td>
<td>Yes/yes</td>
</tr>
<tr>
<td>Designed for assembly/disassembly</td>
<td>Yes</td>
</tr>
<tr>
<td>Standard mask connections</td>
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### Device Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
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<tbody>
<tr>
<td>Components</td>
<td>Oxygen reservoir bag</td>
</tr>
<tr>
<td>Features</td>
<td>Pressure-relief valve</td>
</tr>
<tr>
<td>Packaging</td>
<td>Cardboard box</td>
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<tr>
<td>Single-use/multiuse</td>
<td>Multiuse</td>
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### Laboratory Evaluations

<table>
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<tr>
<th>Feature</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Pressure-limiting valve (15 L/min air flow)</td>
<td>40 cm H₂O</td>
</tr>
<tr>
<td>Cleaning—effectiveness</td>
<td>2</td>
</tr>
<tr>
<td>Disinfection—device durability</td>
<td>2</td>
</tr>
<tr>
<td>Instructions—completeness</td>
<td>3</td>
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<tr>
<td>Instructions—ease of reading</td>
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### Usability

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<tbody>
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<td>Ease of use/comfort</td>
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<tr>
<td>Dissassembly/reassembly</td>
<td>3</td>
</tr>
<tr>
<td>Device ergonomics</td>
<td>4</td>
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</tbody>
</table>
Device Information

Model Number | 820050 Paediatric pocket mask
Supplier | Laerdal Medical AS
PO Box 377
4002 Stavanger
Noroway
Website | www.laerdal.com
Cost (as purchased) | US$14.60
(One-way valve can be purchased separately for use with other masks for US$5.95)

Features That Count

- Mask size: Infant/child
- Mask type: Round one-piece silicone
- Properly sized bag: Not applicable
- Pressure-relief valve/position indication: No
- Designed for assembly/disassembly: Yes
- Standard mask connections: Yes

Device Features

- Components: Nitrile gloves; antimicrobial hand wipe
- Features: Not applicable
- Packaging: Zippered nylon bag
- Single-use/multiuse: Labeled as single-use

Laboratory Evaluations

- Pressure-limiting valve (@ 15 L/min air flow): Not applicable
- Cleaning—effectiveness: 1
- Disinfection—device durability: 1
- Instructions—completeness: 2
- Instructions—ease of reading: Fairly easy

Usability

- Ease of use/comfort: 4
- Disassembly/reassembly: 1
- Device ergonomics: 4
<table>
<thead>
<tr>
<th>Model Number</th>
<th>846030 NeoNatalie infant resuscitator</th>
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</table>
| Supplier    | Laerdal Medical AS  
PO Box 377  
4002 Stavanger  
Norway      |
| Website     | www.laerdal.com                       |
| Cost (as purchased) | **US$15**  
(additional US$2.30 for a supplemental oxygen attachment) |

**Device Information**

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<tr>
<th>Feature</th>
<th>Description</th>
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<tr>
<td>Mask size</td>
<td>Normal and low-birthweight neonate (0/1)</td>
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<td>Mask type</td>
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<tr>
<td>Properly sized bag</td>
<td>Yes</td>
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<tr>
<td>Pressure-relief valve/position indication</td>
<td>Yes/yes</td>
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<td>Designed for assembly/disassembly</td>
<td>Yes</td>
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<tr>
<td>Standard mask connections</td>
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**Device Features**

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<thead>
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<th>Feature</th>
<th>Description</th>
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<tbody>
<tr>
<td>Components</td>
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<tr>
<td>Features</td>
<td>Pressure-limiting valve</td>
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<tr>
<td>Packaging</td>
<td>Resealable plastic bag inside cardboard box</td>
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<td>Single-use/multiuse</td>
<td>Multiuse</td>
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**Laboratory Evaluations**

<table>
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<tr>
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<th>Result</th>
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<tr>
<td>Pressure-limiting valve (@ 15 L/min air flow)</td>
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<tr>
<td>Cleaning—effectiveness</td>
<td>2</td>
</tr>
<tr>
<td>Disinfection—device durability</td>
<td>2</td>
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<tr>
<td>Instructions—completeness</td>
<td>1</td>
</tr>
<tr>
<td>Instructions—ease of reading</td>
<td>Fairly easy</td>
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**Usability**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Rating</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>Disassembly/reassembly</td>
<td>2</td>
</tr>
<tr>
<td>Device ergonomics</td>
<td>1</td>
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<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Very good</td>
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<tr>
<td>2</td>
<td>Good</td>
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<td>3</td>
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<tr>
<td>5</td>
<td>Poor</td>
</tr>
<tr>
<td>Zeal</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Model Number</strong></td>
<td>RSB1001 Infant resuscitator</td>
</tr>
</tbody>
</table>
| **Supplier** | Zeal Medical  
4/19-A, Piramal Indl Estate,  
S.V. Road, Goregoan (W)  
Mumbai-400062  
India |
| **Website** | www.zealmedical.com |
| **Cost (as purchased)** | US$15 |
| **Device Information** |  |
| **Mask size** | Low-birthweight neonate |
| **Mask type** | Round one-piece silicone |
| **Properly sized bag** | Yes |
| **Pressure-relief valve/position indication** | Yes/no |
| **Designed for assembly/disassembly** | Yes |
| **Standard mask connections** | Yes |
| **Features That Count** |  |
| **Components** | Oxygen reservoir bag and tube; oxygen tubing connector |
| **Features** | Pressure-relief valve |
| **Packaging** | Reusable vinyl bag |
| **Single-use/multiuse** | Multiuse |
| **Laboratory Evaluations** |  |
| **Pressure-limiting valve (@ 15 L/min air flow)** | 40–60 cm H₂O |
| **Cleaning—effectiveness** |  |
| **Disinfection—device durability** |  |
| **Instructions—completeness** | No instructions |
| **Instructions—ease of reading** | Fairly easy |
| **Usability** |  |
| **Ease of use/comfort** |  |
| **Disassembly/reassembly** |  |
| **Device ergonomics** |  |

1. Very good  
2. Good  
3. OK  
4. Fair  
5. Poor
### Device Information
<table>
<thead>
<tr>
<th>Model Number</th>
<th>MTM1001 BlowSafe mouth to mask resuscitator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier</td>
<td>Zeal Medical</td>
</tr>
<tr>
<td></td>
<td>4/19-A, Piramal Indl Estate, S.V. Road, Goregoan (W)</td>
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<tr>
<td></td>
<td>Mumbai-400062, India</td>
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<tr>
<td>Website</td>
<td><a href="http://www.zealmedical.com">www.zealmedical.com</a></td>
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<tr>
<td>Approximate cost</td>
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</table>

### Features That Count
- **Mask size**: Neonate (0/1)
- **Mask type**: Round one-piece silicone
- **Properly sized bag**: Not applicable
- **Pressure-relief valve/position indication**: Yes/no
- **Designed for assembly/disassembly**: Yes
- **Standard mask connections**: Yes

### Device Features
- **Components**: No additional components
- **Features**: Pressure-limiting valve
  - Note: cannot lock down.
- **Packaging**: Zippered bag
- **Single-use/multiuse**: Multiuse

### Laboratory Evaluations
- **Pressure-limiting valve (@ 15 L/min air flow)**: 20 cm H₂O
- **Cleaning—effectiveness**: 1
- **Disinfection—device durability**: 1
- **Instructions—completeness**: No instructions
- **Instructions—ease of reading**: No instructions

### Usability
- **Ease of use/comfort**: 3
- **Disassembly/reassembly**: 2
- **Device ergonomics**: 3

Note: The Republic of South Africa does not include the use of tube-and-mask devices in their current guidelines.
Devices
Over
US$30
<table>
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<th>Device Information</th>
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<tbody>
<tr>
<td><strong>Model Number</strong></td>
<td>AMB-288001000 Neonatal resuscitator</td>
</tr>
<tr>
<td><strong>Supplier</strong></td>
<td>Ambu Inc. 6740 Baymeadow Drive Glen Burnie, MD 21060 United States</td>
</tr>
<tr>
<td><strong>Website</strong></td>
<td><a href="http://www.ambu.com">www.ambu.com</a></td>
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<tr>
<td><strong>Mask size</strong></td>
<td>Normal birthweight neonate</td>
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<tr>
<td><strong>Mask type</strong></td>
<td>Round one-piece silicone</td>
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<tr>
<td><strong>Properly sized bag</strong></td>
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</tr>
<tr>
<td><strong>Pressure-relief valve/position indication</strong></td>
<td>Yes/not available</td>
</tr>
<tr>
<td><strong>Designed for assembly/disassembly</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Standard mask connections</strong></td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device Features</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Components</strong></td>
<td>Oxygen reservoir tube</td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td>Pressure-limiting valve Note: cannot lock down</td>
</tr>
<tr>
<td>** Packaging**</td>
<td>Resealable plastic bag</td>
</tr>
<tr>
<td><strong>Single-use/multiuse</strong></td>
<td>Multiuse</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laboratory Evaluations</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pressure-limiting valve (@ 15 L/min air flow)</strong></td>
<td>40 cm H2O</td>
</tr>
<tr>
<td><strong>Cleaning—effectiveness</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Disinfection—device durability</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Instructions—completeness</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Instructions—ease of reading</strong></td>
<td>Fairly difficult</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Usability</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ease of use/comfort</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Disassembly/reassembly</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Device ergonomics</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

**Very good**

**Good**

**OK**

**Fair**

**Poor**
### Model Number
**BC-2020-RV-CI Neonatal silicone resuscitator**

### Supplier
Blue Cross Emergency Co. 3-12-9, Hongo, Bunkyo-ku Tokyo 131-0033, Japan

### Website
www.bluecross-e.co.jp

### Cost (as purchased)
US$100

### Mask size
Full-term neonate

### Mask type
Round two-piece. Clear hard plastic top; opaque silicone face seal

### Properly sized bag
Yes

### Pressure-relief valve/position indication
No/not available

### Designed for assembly/disassembly
Yes

### Standard mask connections
Yes

### Components
Open-end oxygen reservoir

### Features
Not applicable

### Packaging
Plastic resealable bag inside cardboard box

### Single-use/multiuse
Multiuse

### Pressure-limiting valve (@ 15 L/min air flow)
Not applicable

### Cleaning—effectiveness

### Disinfection—device durability

### Instructions—completeness
(Indicates that 50 cm H₂O pressure should be generated)

### Instructions—ease of reading
Standard

### Ease of use/comfort

### Disassembly/reassembly

### Device ergonomics

---

**1** Very good  **2** Good  **3** OK  **4** Fair  **5** Poor
Laerdal

**Model Number**  86005133 Silicone infant resuscitator

- **Supplier**: Laerdal
  167 Myers Corners Rd
  Wappingers Falls, NY
  12590-8840
  United States

- **Website**: www.laerdal.com

- **Cost (as purchased)**  US$225

### Features That Count

- **Mask size**: Neonate (0/1)
- **Mask type**: Round one-piece silicone
- **Properly sized bag**: Yes
- **Pressure-relief valve/position indication**: Yes/cannot disable
- **Designed for assembly/disassembly**: Yes
- **Standard mask connections**: Yes

### Device Features

- **Components**: Oxygen reservoir bag
- **Features**: Pressure-limiting valve
- **Packaging**: Plastic resealable bag inside cardboard box
- **Single-use/multiuse**: Multiuse

### Laboratory Evaluations

- **Pressure-limiting valve** (@ 15 L/min air flow): 32 cm H₂O
- **Cleaning—effectiveness**: 3
- **Disinfection—device durability**: 3
- **Instructions—completeness**: 3
- **Instructions—ease of reading**: Difficult

### Usability

- **Ease of use/comfort**: 3
- **Disassembly/reassembly**: 3
- **Device ergonomics**: 2

**Quality Ratings**

# Practical selection of neonatal resuscitators

## Unomedical

<table>
<thead>
<tr>
<th>Device Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model Number</strong></td>
<td>Hospitak 735-E</td>
</tr>
<tr>
<td>Supplier</td>
<td>Unomedical (USA)</td>
</tr>
<tr>
<td></td>
<td>5701-1 S. Ware Rd</td>
</tr>
<tr>
<td></td>
<td>McAllen, Texas</td>
</tr>
<tr>
<td></td>
<td>78503</td>
</tr>
<tr>
<td></td>
<td>United States</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.unomedical.net">www.unomedical.net</a></td>
</tr>
<tr>
<td><strong>Cost (as purchased)</strong></td>
<td><strong>US$30</strong></td>
</tr>
</tbody>
</table>

## Features That Count

<table>
<thead>
<tr>
<th>Mask size</th>
<th>Normal birthweight neonate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mask type</td>
<td>Anatomical two-piece plastic with air-filled bladder</td>
</tr>
<tr>
<td>Properly sized bag</td>
<td>Yes</td>
</tr>
<tr>
<td>Pressure-relief valve/position indication</td>
<td>Yes/no</td>
</tr>
<tr>
<td>Designed for assembly/disassembly</td>
<td>No (designed for single use)</td>
</tr>
<tr>
<td>Standard mask connections</td>
<td>Yes</td>
</tr>
</tbody>
</table>

## Device Features

<table>
<thead>
<tr>
<th>Components</th>
<th>Oxygen reservoir tube (attached); oxygen tubing connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features</td>
<td>Pressure-limiting valve Note: cannot lock down</td>
</tr>
<tr>
<td>Packaging</td>
<td>Plastic bag</td>
</tr>
<tr>
<td>Single-use/multiuse</td>
<td>Single-use</td>
</tr>
</tbody>
</table>

## Laboratory Evaluations

| Pressure-limiting valve (@ 15 L/min air flow) | Not applicable |
| Cleaning—effectiveness | 4 (designed for single use) |
| Disinfection—device durability | Not applicable (designed for single use) |
| Instructions—completeness | 2 |
| Instructions—ease of reading | Very difficult |

## Usability

| Ease of use/comfort | 2 |
| Disassembly/reassembly | 4 (designed for single use) |
| Device ergonomics | 5 |

Note: The Hospitak resuscitator is designated as a single-use device. The Hospitak is not designed for disassembly or constructed of materials that would remain functional after multiple disinfections.
### Device Information

<table>
<thead>
<tr>
<th>Model Number</th>
<th>VBM 80-10-300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier</td>
<td>VBM Medical Inc.</td>
</tr>
<tr>
<td></td>
<td>524 Herriman Court</td>
</tr>
<tr>
<td></td>
<td>Noblesville, IN</td>
</tr>
<tr>
<td></td>
<td>46060</td>
</tr>
<tr>
<td></td>
<td>United States</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.vbm-medical.com">www.vbm-medical.com</a></td>
</tr>
<tr>
<td>Cost (as purchased)</td>
<td>US$30</td>
</tr>
</tbody>
</table>

### Features That Count

<table>
<thead>
<tr>
<th>Mask size</th>
<th>Normal birthweight neonate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mask type</td>
<td>Round one-piece silicone</td>
</tr>
<tr>
<td>Properly sized bag</td>
<td>Yes</td>
</tr>
<tr>
<td>Pressure-relief valve/position indication</td>
<td>Yes/yes</td>
</tr>
<tr>
<td>Designed for assembly/ disassembly</td>
<td>Yes</td>
</tr>
<tr>
<td>Standard mask connections</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Device Features

<table>
<thead>
<tr>
<th>Components</th>
<th>No additional components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features</td>
<td>Pressure-relief valve</td>
</tr>
<tr>
<td>Packaging</td>
<td>Plastic bag</td>
</tr>
<tr>
<td>Single-use/multiuse</td>
<td>Multiuse</td>
</tr>
</tbody>
</table>

### Laboratory Evaluations

<table>
<thead>
<tr>
<th>Pressure-limiting valve (@ 15 L/min air flow)</th>
<th>33 cm H₂O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning—effectiveness</td>
<td>2</td>
</tr>
<tr>
<td>Disinfection—device durability</td>
<td>2</td>
</tr>
<tr>
<td>Instructions—completeness</td>
<td>2</td>
</tr>
<tr>
<td>Instructions—ease of reading</td>
<td>Standard</td>
</tr>
</tbody>
</table>

### Usability

| Ease of use/comfort                           | 2         |
| Disassembly/reassembly                        | 2         |
| Device ergonomics                             | 2         |

**Rating Scale**

- **Very good**: 1
- **Good**: 2
- **OK**: 3
- **Fair**: 4
- **Poor**: 5
This information was made possible in part by the generous support of The Atlantic Philanthropies as well as in part by the generous support of the American people through the US Agency for International Development under the HealthTech program managed by PATH under Cooperative Agreement #GPH-A-00-01-00005-00. The opinions expressed herein are those of the authors and do not necessarily reflect the views of the US Agency for International Development.

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