cleared at the end of expiration, thereby lowering anatomical dead-space. Other advantages of nasal HF therapy are that users can eat and drink whilst wearing a cannula and cannulas are much smaller and lower profile than typical positive pressure interfaces, thus making them less invasive. However, nasal cannulas are not always suitable for users that experience respiratory distress, including hyperventilation, as they do not provide pressure support.

[0012] The systems, methods and devices described herein have innovative aspects, no single one of which is indispensable or solely responsible for their desirable attributes. Without limiting the scope of the claims, some of the advantageous features will now be summarized. An object of at least one embodiment is to provide a respiratory mask capable of being applied to a patient's face in combination with a nasal cannula, to deliver high flow therapy with increased or controlled expiratory pressure or to provide the industry or public with a useful choice.

[0013] In some configurations, a respiratory mask is configured to overlay a nasal cannula fitted to a user's face. The mask includes a cushion configured to seal with a user's face, allowing a breathing cavity or interior space of the mask to be pressurized. Pressurization of the mask allows for expiratory pressure to be increased or controlled, which may help to treat respiratory distress in COPD patients receiving HF therapy via nasal cannula. The mask is configured to be secured to the user independently of the nasal cannula, thus allowing increased expiratory pressure to be selectively applied. Preferably, the sealing cushion of the mask can include recesses or cut-outs that substantially fit the geometry of a nasal cannula. The mask can include one or more one-way valves that allow entrainment of ambient air during inhalation.

[0014] In a preferred configuration, there is provided an interface system comprising a nasal cannula comprising a cannula body, at least one nasal prong extends from the cannula body, a gases tube that communicates with the at least one nasal prong and a cannula retention arrangement that is coupled to the cannula body and retains the nasal cannula on the head of a user; a mask having a mask body, the mask body defining a user-contacting surface and an interior space when the user-contacting surface is in contact with a face of the user, the mask being adapted to create a seal around the nose and/or mouth of the user when the mask is used in combination with the nasal canula, the mask further comprising a mask retention arrangement that is coupled to the mask body and retains the mask on the head of the user; wherein the interior space of the mask accommodates at least a portion of the cannula body including the at least one nasal prong when the mask is positioned on the head of the user with the user-contacting surface in contact with the face of the user, and wherein the mask is selectively

securable to or removable from a user independently of the nasal canula, wherein the mask comprises one or more fixed bias flow vents that allow the flow of breathable gases from inside the mask to the atmosphere.

[0015] In such a configuration, the seal is sufficient to provide increased expiratory pressure relative to use of the nasal cannula without the mask. In some such configurations, the mask is also adapted to create a seal around the nasal cannula when the mask is used in combination with the nasal cannula and when the user-contacting surface is in contact with the face of the user, the seal around the nose and/or mouth and the seal on the nasal cannula being sufficient to provide increased expiratory pressure relative to use of the nasal cannula without the mask.

[0016] In some configurations, the mask body comprises a frame, wherein the mask retention arrangement is coupled to the frame.

[0017] In some configurations, the mask retention arrangement comprises a mask headgear.

[0018] In some configurations, the cannula retention arrangement comprises a cannula headgear. In some configurations, the cannula headgear comprises a strap that, in use, extends around the head of the user.

[0019] In some configurations, the cannula body comprises a pair of side arms on opposing sides of the cannula body, wherein the cannula headgear is coupled to each of the pair of side arms.

[0020] In some configurations, the mask body comprises at least one recess adapted to allow the nasal cannula to extend from within the interior space to outside of the interior space.

[0021] In some configurations, the at least one recess is adapted to accommodate the gases tube.

[0022] In some configurations, the at least one recess comprises a semi-circular profile.

[0023] In some configurations, the at least one recess comprises a portion shaped to correspond to a shape of the gases tube.

CLAIMS:

1. An interface system, comprising:

a nasal cannula (102) comprising a cannula body (150), at least one nasal prong (152) extending from the cannula body (150), a gases tube (154) that communicates with the at least one nasal prong (152) and a cannula retention arrangement that is coupled to the cannula body (150) and retains the nasal cannula (102) on the head of a user;

a mask (100) having a mask body (170), the mask body defining a user-contacting surface (172) and an interior space when the user-contacting surface is in contact with a face of the user, the mask (100) being adapted to create a seal around the nose and/or mouth of the user when the mask (100) is used in combination with the nasal canula (102), the mask further comprising a mask retention arrangement that is coupled to the mask body (170) and retains the mask on the head of the user;

wherein the interior space of the mask (100) accommodates at least a portion of the cannula body (150) including the at least one nasal prong (152) when the mask (100) is positioned on the head of the user with the user-contacting surface in contact with the face of the user, and

wherein the mask (100) is selectively securable to or removable from a user independently of the nasal canula (102), characterized in that the mask (100) comprises one or more fixed bias flow vents (116) that allow the flow of breathable gases from inside the mask (100) to the atmosphere.

2. The interface system of Claim 1, wherein when the user-contacting surface (172) is in contact with the face of the user, the seal is sufficient to provide increased expiratory pressure relative to use of the nasal cannula (102) without the mask (100), and wherein the gases tube (154) of the nasal canula (102) is connected to a source of pressurized gases.

3. The interface system of Claim 1 or Claim 2, wherein the mask body (170) comprises a frame (108), wherein the mask retention arrangement comprises a mask headgear coupled to the frame (108) and wherein the cannula retention arrangement comprises a cannula headgear that comprises a strap (156) that, in use, extends around the head of the user, and wherein the cannula body (150) comprises a pair of side arms on opposing sides of the cannula body (150), wherein the strap (156) of the cannula headgear is coupled to each

of the pair of side arms.

4. The interface system of any one of Claims 1-3, wherein the mask retention arrangement comprises a head strap (110) including a bifurcated strap, wherein the bifurcated strap is made from an elastic material.

5. The interface system of any one of Claims 1-4, wherein the cannula retention arrangement comprises one or more adjustment mechanisms (158) that permit adjustment of a length of the cannula retention arrangement, and wherein the mask retention arrangement comprises an adjustment mechanism.

6. The interface system of any one of Claims 1-5, wherein the mask body (170) comprises at least one recess (106) adapted to allow the nasal cannula (102) to extend from within the interior space to outside of the interior space, and wherein the mask is adapted to create a seal around the nasal cannula (102) when the mask (100) is used in combination with the nasal cannula (102).

7. The interface system of Claim 6, wherein the shape of the at least one recess (106) is configured to accommodate, complement or match the lateral geometry of the nasal cannula (102) that extends through the at least one recess.

8. The interface system of Claim 7, wherein the at least one recess is adapted to accommodate the gases tube, and preferably wherein the at least one recess comprises a semi-circular profile.

9. The interface system of any one of Claims 5-8, wherein the mask body (170) comprises a cushion that defines the user-contacting surface, wherein the at least one recess is at least partially defined by the cushion, preferably wherein the at least one recess interrupts the user-contacting surface.

10. The interface system of any one of Claims 5-9, wherein the at least one recess comprises a first recess on a first side of the mask and a second recess on a second side of the mask, preferably wherein the first recess and the second recess have shapes or sizes that are different from one another.

11. The interface system of any one of Claims 6-10, wherein the cannula body (150) comprises a frame (160) that supports the prongs (152), wherein a portion of the frame (160) of the nasal cannula (102) passes between the mask (100) and the user's face on one side of the mask (100) and the recess (106) on that side has a shape that generally corresponds to the shape of the portion of the frame (160) that underlies the cushion (104), on the other side of the mask (100), a portion of the frame (160) and the supply tube (154) passes between the cushion (104) and the user's face, and the recess (106) on the other side comprises a shape that generally corresponds to the shape of the supply tube (154).

12. The interface system of any one of the preceding claims, wherein the mask (100) is configured to be selectively applied to the user without removal of the nasal cannula (102).

13. The interface system of any one of the preceding claims, wherein one or more one-way valves (112) are provided on the mask (100).

14. The interface system of any one of the preceding claims, wherein a variable vent (114) is included in the mask (100).

15. The interface system of any one of the preceding claims, wherein the mask (100) does not include an air supply conduit or connection port.