Reusable fabric cover for N95 mask

Best practices are to discard n95 after each individual patient contact. However in this current crisis, severe shortages of PPE are requiring health care workers to continue using these masks as long as possible. Prolonged usage increases risk of viral transmission to others due to surface contamination so various ways to decontaminate these masks have been proposed. However, as the filters become clogged with debris, airflow through the masks goes down making them harder to breath through, not only making the masks more uncomfortable, but also increasing worker fatigue.

Key Points –

* N95 designed for single use, should be discarded after each patient contact
* Severe shortages causing need for prolonged wear and re-use
* Risk of surface contamination high - >10 % in non-pandemic study after 6 hours
* UV and dry heat ~ 70 C likely effective to re-sterilize, but degrades materials so limit to number of repeats
* Filters become clogged over time, leading to decreased air flow, higher work of breathing and greater worker fatigue.
* Reusable covers may help address both issues and increase usable life span for single N95 mask.
* Covers need to be easy to put on/take off with mask in place
* Cover must not interfere with mask seal
* Should not significantly increase work of breathing
* Should have some degree of efficacy at blocking viral size particles in one or both directions.

N 95 mask covers – Simple tube of medium weight t-shirt or jersey knit fabric about 8 inches long and 5 inches wide with elastic ear loops on each end. Longer straps could be used to secure around head if desired. Fabric ties can replace elastic if needed

Pros

Covers easy to apply without disturbing N95 mask allowing them to be easily changed between patients

T- shirt material has enough stretch to provide close fit over mask but does not significantly add to work of breathing.

Construction is extremely simple with readily available materials allowing for rapid large scale production by home sewers.

Absorbent double layer construction should reduce liquids coming in contact with surface of mask.

Easily washed/dried at recommended temperatures.

Block large particles which may rapidly clog N95 filter

Some evidence that it may block up to 50% of viral size particles but primary protections is from N95 mask.

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Cons

Elastic will degrade with high temps – can be replaced if needed

Fabric also degrades over time, becoming less effective at particle blocking

Possible increased risk for virus transmission if soiled covers not handled appropriately – same risk as for other contaminated linen

Efficacy is strictly theoretical and is based on very limited data – almost no studies available.

Sewing Instructions

Materials –

New medium weight jersey knit or t-shirt weight fabric

Swim wear elastic or regular elastic – ¼ “-1/2 ” width – what ever is still available

Fabric or ribbon ties could be used if elastic not available – need to make sure it can be tied securely without slipping

Instructions

Use 1.5 cm (5/8 inch) seam allowance and double stitch/ 2 rows of stitches for seams to decrease risk of gaps developing over time. Stretch stich or serger helpful but not required

Cut fabric into strip measuring 23 cm (9 inches) by 28 cm (11 inches)

Finish edges on long sides – serge, bind, or fold over 1 cm (1/2 inch) and stitch

Fold in half lengthwise with right sides together – to make a rectangle about 20 cm x 13 cm (8 inches x 13 inches)

Sew a double line of stitches along the longer ( 20 cm/ 8 inch) edge of the rectangle

Turn right side out

Starting about 1.5 cm (5/8 inch) from the top, stitch along the shorter side openings, stopping 1.5 cm (5/8 inch) from the bottom. Reinforce beginning and end of stitching. Repeat with a second row of stitches close to the first row to reinforce seam.

Add elastic for ear loops

Insert 1 piece of elastic into the top opening on right side, feed down and out the opening at the bottom on the same side.

Join ends of elastic with zigzag stitch – or whatever way you find most effective.

Repeat on the left side

Do not sew the elastic or fabric ties to the mask covers as this will make them more difficult to replace if needed. Also, this construction helps to gather the ends of the cover over the mask, improving the fit and coverage when the mask cover is in place.

Some modifications may be needed if using fabric ties or elastic straps around the head –

Elastic straps around the head

– cut a single piece of elastic ~ 62 cm ( 24 inches) long

- insert one end into the top opening on the Right side, out the bottom opening on the R side. – leaving about 10 inches for the back of the head, insert the same end of elastic into the bottom opening on the Left side and out the top opening on the L. Join the 2 ends together making a continuous loop.

This should make an upper and lower strap across the back of the head but provide some gathering of the fabric on either end

Fabric ties –

Can be installed in a similar manner to the elastic around the head straps with the free ends tied together at the back of the head or can install separate strap on each side and have 2 both ends tied at the back of the head –

Cut 1 strap 125 cm (28 inches) long and insert as per elastic straps – do not sew ends together as these will be tied when mask cover put on.

Or

Cut 2 62 cm(24 inch) fabric or ribbon ties

Insert 1 into the top opening on Right and out the bottom on same side

Repeat on opposite side