

嬰兒床口罩概念防護罩

新生兒科

鄭枚枝醫師、溫凱婷研究護理師

摘要

新冠肺炎疫情爆發後,防阻氣溶膠散播或吸入至為關鍵。配戴口罩可減少暴露於環境中含有病菌或其他有害物質之傳播。新生兒免疫力低弱易受感染,醫院的新生兒病房設計非每床都有隔間或隔牆。在多人同處一室之病室環境下要盡量避免交互感染不易,因此讓嬰兒也具有配戴口罩效果的方式來保護住院中的嬰兒是值得研究設計的重要議題。住院的早產兒或高風險新生兒的呼吸系統問題很常見,有些個案還須接受呼吸治療或胃管灌食等許多治療與處置,醫療人員需隨時注意寶寶的外觀與作治療,故「方便安全且可直接觀察」的需求很重要。本計畫目的是以透明無毒材料建構成有口罩概念的透明立體罩子,初步目標是使用於住院寶寶的嬰兒床上。

我們依住院嬰兒床的大小設計出符合需求的嬰兒床口罩概念防護罩。先畫出設計圖後以 3D 列印方式製作出來,在多次測試與改良後選出兩款成品,分別為以模型製作方式人工打造的聚碳酸酯(Polycarbonate, PC)以及以折疊式片裝組合式的對苯二甲酸乙二醇酯(Amorphous Polyethylene Terephthalate, A-PET) 的防護罩成品,加上使用防霧的奈米蛾眼科技透明防護面罩材質的塑膠片於正前方。使用時將其架設於嬰兒床頭端,避免直接與嬰兒皮膚接觸,是輕便舒適、美觀、多功能且可長時間使用的住院嬰兒口罩概念防護罩,目的是提升住院中新生兒的呼吸道感染防護。

本專案研發出的“**嬰兒床口罩概念防護罩**”未來將持續與應用化學系學者合作找最佳製作材質,將進一步做使用時的測試噪音、空氣品質與光等以確定其效能。未來亦將作進一步優化與使用後評估以進一步優化。設計過程遇到各種困難,製作時發現研發一項新產品所需經費極高。未來使用的主要對象是還不會翻身的小嬰兒,住院中或在照護中心皆可使用。潛在可擴大對象為其他臥床且須密切觀察臉部狀態,無法戴口罩的大小孩或成人。研發成品將作國內外的推廣也朝向取得國內外專利權來努力。

中英文關鍵詞: 嬰兒床、口罩、防護罩

嬰兒床口罩概念防護罩

新生兒科

鄭枚枝醫師、溫凱婷研究護理師

Abstract

After the outbreak of COVID- 19 , wearing a mask has become the most basic anti-epidemic tool which can reduce exposure to droplets or aerosols that may contain viruses in the environment, and can also reduce the chance of infecting others around. Adults wear masks to protect themselves as well as others, but it is not easy for a child, newborn or infant to wear a mask reliably at all times. Neonatal immunity is weak and susceptible to infections, and the neonatal ward of a hospital is usually not designed with a compartment or partition wall for each bed. It is difficult to avoid cross-infection in such ward environment where many people are in the same room. Therefore, it is an important issue worthy of research design to protect the hospitalized infants by using a face mask concept protective cover frame.

Respiratory problems are common in hospitalized premature infants or high-risk neonates, and some cases may require many managements such as respiratory therapy or gastric tube feeding. Because they cannot wear masks directly, the risk of cross-infection is high. In addition, medical personnel need to watch the baby's appearance and movement at any time, so the need to "observe the baby directly" is also very important, and it is also necessary to reduce the irritation of the baby's eyes from the light source above. In view of the above design requirements, this project will use transparent and non-toxic materials to construct a transparent three-dimensional cover with the concept of face masks by using it in the cribs of the hospitalized infants. The idea of the face mask concept is to design two big holes on the top or bilateral sides of the cover, so that the spread surgical masks can be fixed above the hole as a filter for gas in and out. The surgical masks can be replaced every day, and there is a movable light shield on the top.

We will design several suitable hospitalized baby mask concept shields according to the size of the crib and the weight of the hospitalized infant. When using it, it is installed at the front of the crib and has no direct contact with the baby's skin. Therefore, this project will have a newly designed face mask concept protective cover frame which is comfortable, multi-functional, beautiful and suitable for long-term use on hospitalized infants, as well as get improvement in respiratory infection prevention quality.

The production of the **face mask concept protective cover frame for infant's bed** will be proceeded in the following steps: (1) 3D printing the designed works for testing and revision (in progress) ; (2) Cooperating with scholars from the Institute of Materials Research to find the best material ; (3) Cooperating with the Institute of Environmental Health to test noise, air quality and light ; (4) Looking for suitable manufacturers for production ; (5) Evaluation after clinical practice.