Brief report

Mask wearing leak rate（fitting check）using the N95 mask（N95 Hi-Luck 350, Koken, Tokyo）for dusts in our clinical laboratory

Department of pathology, JA Niigata Nagaoka Central General Hospital

Toshihiko Ikarashi

Introduction

We should master a skill of right mask wearing on our faces to avoid dust exposure including tubercle bacillus（$0.3-0.6\mu$m in diameter）, corona virus（0.1μm）, and other infecting organisms. For the prevention of these airborne infection（droplet nuclei infection=aerosol infection）, N95 mask（disposable solid-coping（DS）, rank 2 of 95% sampling efficiency）is efficient for the fine particle filtration blockade（PFE, $\varphi\ 0.1\mu$m）and the virus filtration blockade（VFE, $\varphi\ 2.8\mu$m）. It is required to control a leak rate below 5% and the N95 mask of rank 2 of 95% collection efficiency is regarded as most useful. The use of rank 3 of 99.5% collection efficiency is thought to be ideal, but the rank 3 is inappropriate for work because of its severe dyspnea. Thus, it is very important to find the inappropriate mask wearing staff of a leak rate more than 5% and to teach the right mask wearing method. In this study the leak rate of N95 mask（Koken, DS2, high lac 350）was studied with Fit tester（Roken-Shiki mast fitting tester MT-05U type, Sibata Scientific Technology, Tokyo）.

Studies

The subject was 14 this hospital pathology laboratories authorized by ISO15189. At first, 1. Measured a leak rate when breathed calmly, and established the right mask wearing by the corrective action for the cases of leak rate more than 5%. 2. Measured again while adding both utterance and neck rotation as routine works and conducted a corrective action.

Results

We conducted a confirmation test of right wearing（leak rates less than 55）of the N95 disposable masks to 14 staffs of our pathological department（Table）. The inappropriate mask wearing staffs were two at resting breathing, and three at utterance and head rotation（21%）. Their poor mask-wearing was adjusted to fit up to three times while looking at mirror.

The main cause of inappropriate mask-wearing was regarded as the slack of the rubber bands. The so-called etiquette mask and the substitute N95 mask were invalid with 100% of leak rates. Infection prophylaxis such as the tubercle bacillus and corona virus requires the N95 mask certified by the national standard.

Key words : droplet nuclei or aerosol infection, aerial infection or air-borne infection or droplet nuclei infection, N95 mask（Koken）= non-liquid（solid）rank 2 95% collection efficiency mask for metal fume or standard control concentration less than 0.1mg/m3, particle filtration efficiency（PFE）, viral filtration efficiency（VFE）, leak rate, Fit tester（Roken-Shiki mast fitting tester MT-05U type, Sibata Scientific Technology, Tokyo）

和　文　抄　録

短報

臨床検査室における粉じん対策用呼吸用保護具 N95マスク（興研）の顔への密着性（フィットテスト）の検討

長岡中央綜合病院、病理部；病理医

五十嵐俊彦

　感染予防の目的で、ISO15189 認定 JA 新潟県長岡中央病院病理部員14名に対して、N95 使い捨てマスクの正しい装着（漏れ率5％以下）の確認テストを実施した。
　不適切なマスク装着率は、安静時呼吸時2名、（発声と首振り作業時呼吸時3名（21％）であった。鏡を見ながら最大3回調整することにより、正しいマスクの装着ができた。不適切なマスク装着の原因は、ゴム紐のゆるみと考えられた。
　エチケットマスク、代替 N95 マスクは、漏れ率100％で、無効であった。結核菌やコロナウイルス等の感染予防には、国家規格認定の N95 マスクでの対応が必要である。

Mask wearing leak rate (fitting check) using the N95 mask (N95 Hi-Luck 350, Koken, Tokyo) for dusts in our clinical laboratory

Table. Measurement of a leak rate and corrective actions

1. Measurement of a leak rate when breathed calmly, and corrective actions

case	male	female	age	work	experience years	leak rate						
						1 st exam	corrective action	2 nd exam	corrective action	3 rd exam	corrective action	4 th exam
1	●		68	doctor	43	2.26						
2	●		50		28	2.83						
3	●		50		29	22.36	adherence at chin	13.36	reclamping rubber bands	0.64		
4	●		46		13	2.11						
5		●	33		6	0.32						
6		●	29		4	0.49						
7		●	24	laboratory technician	2	0.67						
8		●	48		27	89.4	reclamping rubber bands	19.12	reclamping rubber bands	6.5	reclamping rubber bands	0.15
9		●	47		26	0.99						
10	●		38		8	2.41						
11		●	26		4	0.36						
12		●	22		0	1.36						
13		●	48	clerk	9	1.97						
14		●	47		1	1.13						

2. Measurement of a leak rate again while adding both utterance and head rotation as routine works, and corrective actions

case	male	female	age	work	experience years	leak rate						
						1 st exam	corrective action	2 nd exam	corrective action	3 rd exam	corrective action	4 th exam
1	●		68	doctor	43	2.41						
2	●		50		28	1.25						
3	●		50		29	1.94						
4	●		46		13	2.98						
5		●	33		6	1.16						
6		●	29		4	1.67						
7		●	24	laboratory technician	2	15.68	reclamping rubber bands	1.04				
8		●	48		27	10.89	reclamping rubber bands	0.21				
9		●	47		26	2.26						
10	●		38		8	5.64	reclamping rubber bands	6.32	adherence at chin	26.25	reclamping rubber bands	0.14
11		●	26		4	0.79						
12		●	22		0	2.79						
13		●	48	clerk	9	3.75						
14		●	47		1	0.17						