



Case Study - Antiviral performance assessment of NANOSHIELD™ protective film after six month trials in Japanese nursing care and medical facilities.

Testing parameters for durability and efficacy effectiveness.

Multiple nursing care facilities and one medical facility in Japan were selected as trial locations for NanoShield antiviral protective film. NanoShield was installed on door handles and handrails at a total of 16 locations.

The locations were operated under a typical day to day conditions and cleaning protocols. At the end of six months, NanoShield was removed and evaluated for efficacy testing. The antiviral performance evaluation was carried out under ISO 22196 standards.

Viruses used in the evaluation: Influenza virus (H3N2) A/Kitakyusyu/159/93

1. The recovered NanoShield processed PET film was cut.
2. A 100- μ L of the viral suspension was added, and a 4 \times 4 cm cover film was covered with it.
3. Settle at 25°C for 15 minutes.
4. The specimen surface was washed out with medium containing surfactants.
5. The virus infectious titer (virus count) in the above washout solution was measured by plaque test.
6. The antiviral activity value was evaluated as the following equation.

$$R = U_t - A_t$$

R: Antiviral activity value

U_t: Logarithmic values of viral infectious titers obtained from tests using raw samples.

A_t: The logarithmic value of the viral titer obtained in an antiviral test using processed antiviral specimens (actual use specimens).

Evaluation Results

NanoShield was installed at 16 locations within three facilities and used for six months. The contact time between the specimen and the virus suspension was all 15 minutes. The evaluation results of the antiviral activity of unused and actual samples with six months use are shown in the table below.

Sample	Setting		Antiviral activity value	Reduction rate	P/F
Standard value			≥ 3	$\geq 99.9\%$	-
Unused sample			$\geq 3.6^*$	$\geq 99.9\%$	OK
Actual sample	nursing home A	Bathroom handrail	2.6	$\geq 99.8\%$	
		Handrail	≥ 3.6	$\geq 99.9\%$	OK
		handrail	≥ 3.6	$\geq 99.9\%$	OK
		Living room door	≥ 3.6	$\geq 99.9\%$	OK
		Living room door	≥ 3.6	$\geq 99.9\%$	OK
	nursing home B	Restroom door	≥ 3.6	$\geq 99.9\%$	OK
		Restroom door	≥ 3.6	$\geq 99.9\%$	OK
		Restroom handrail	≥ 3.6	$\geq 99.9\%$	OK
		Clean room door	≥ 3.6	$\geq 99.9\%$	OK
		Clean room door	≥ 3.6	$\geq 99.9\%$	OK
	nursing home A	Bathroom handrail	≥ 3.6	$\geq 99.9\%$	OK
		NS* door	≥ 3.6	$\geq 99.9\%$	OK
		NS door	≥ 3.6	$\geq 99.9\%$	OK
		NS door	≥ 3.6	$\geq 99.9\%$	OK
		Indoor door	≥ 3.6	$\geq 99.9\%$	OK
		Indoor door	≥ 3.6	$\geq 99.9\%$	OK

*NS : nurse station