

Supplementary material

Acceptable task performance

SMI

Task step	Acceptable	Unacceptable
Priming	Attempted	Ignored, skipped
Do not rotate clear base until cartridge inserted	Ignored, skipped	Any rotation or attempt
Press safety catch	Pressed sufficient to release clear base Pressed insufficient once	Ignored, skipped Pressed insufficient repeatedly
Pull off clear base	Clear base removed entirely	Ignored, skipped
Do not touch piercing element	Ignored, skipped	Any attempt
Push narrow end of cartridge into base of inhaler	Narrow end pushed, seal broken	Wrong end pushed sufficient to break seal
Place cartridge on hard surface to push firmly (until 1/8 inch is visible)	Pushed in, 1/8 inch visible	Ignored, skipped Greater than 1/8 inch visible
Replace clear base	Replaced, catch engaged	Ignored, skipped Replaced, catch not engaged
Hold inhaler upright	Held $\leq 45^\circ$ of upright	Held $> 45^\circ$ of upright
Turn clear base in direction of arrows on label until it clicks (1/2 turn)	Rotated audible click Wrong way single attempt	Ignored, skipped Insufficient rotation, no click heard Wrong way, repeated attempts Rotated $> 1/2$ turn Rotated > 1 click audible Finger on button & activates
Open cap	Cap open enough to clear plume	Already opened Ignored, skipped Opened but plume impinged
Point device down, away from face and others	Held $> 45^\circ$ of upright Held in fume hood Held away from face/others	Held $\leq 45^\circ$ of upright At point of activation... outside fume hood pointed at face/others
Press dose release button	Pressed sufficient to activate Pressed insufficient once	Ignored, skipped Pressed insufficient repeatedly

Replace cap	Cap audible click	Ignored, skipped
Repeat until spray is visible	Repeated, plume visible Repeated after plume visible	Ignored, skipped
Repeat 3 more times	Repeated 3 times ^a Repeated 3–6 times	Ignored, skipped Repeated 2–3 times Repeated ≥ 6 times
[If not used for 3 days, spray 1 puff toward ground]	Observable recognition of 3 days Sprayed $>45^\circ$ of upright Sprayed in fume hood Sprayed away from face/others	Ignored, skipped No recognition of 3 days Confusion with 21 days Sprayed $\leq 45^\circ$ of upright Sprayed outside fume hood Sprayed pointed at face/others
[Reprime after 21 days of non-use] ^b	Observable recognition of ≤ 21 days Confusion with 3 days Sprayed $>45^\circ$ of upright Sprayed in fume hood Sprayed away from face/others	Ignored, skipped No recognition of 21 days Belief >21 days Sprayed $\leq 45^\circ$ of upright Sprayed outside fume hood Sprayed pointed at face/others
Use	Attempted	Ignored, skipped
Hold inhaler upright	Held $\leq 45^\circ$ of upright	Held $>45^\circ$ of upright
Turn clear base in direction of arrows on label until it clicks ($\frac{1}{2}$ turn)	Rotated audible click Wrong way single attempt	Ignored, skipped Insufficient rotation, no click heard Wrong way, repeated attempts Rotated $>\frac{1}{2}$ turn Rotated >1 click audible Finger on button and activates
Open cap	Cap open enough to clear plume	Already opened Ignored, skipped Opened but plume impinged
Breathe out fully from mouth	Any observable exhalation (audible, visible) [‘Fully’ not assessed]	Ignored, skipped
Close lips around mouthpiece	Observable seal of lips to mouthpiece	Observable gap(s) Other part of device in mouth Vent holes obscured/covered
Point inhaler to back of throat	Observable correct direction for $>50\%$ of inhalation	Wrong direction $\leq 50\%$ of inhalation
Inhale slowly through mouth	Observable slow inhalation (i.e., >2 seconds) through mouth	Ignored/skipped Rapid inhalation (i.e., <2 seconds) Observable nasal inhalation

AND		Inhalation stops before press No inhalation within 2 seconds of press
Press down on top of inhaler (release puff)	Pressed sufficient to activate Pressed insufficient once	Ignored, skipped Pressed insufficient repeatedly Pressed in wrong place
Remove mouthpiece	Mouth closed	Ignored, skipped Plume evident from device or mouth Base turned during plume
AND		Observable exhalation
Hold breath for 10 seconds	Observable breath hold >5 seconds	Ignored, skipped Exhalation after ≤ 5 seconds
Breathe out	Observable breath	Through device
Close cap		Ignored, skipped
Repeat 1 more times (total 2)	Repeated	Ignored, skipped Insufficient rotation, no click heard Wrong way, repeated attempts Rotated $> \frac{1}{2}$ turn Rotated > 1 click audible Finger on button and activates Repeated ≥ 2 times
Disposal		
[When dose indicator shows ≤ 14 , i.e. red scale portion]	Mention reorder of new device Mention when probed	Ignored/skipped No mention (when probed)
[When dose indicator shows ≤ 0]	Rejection of device Mention rejection Mention when probed	Observed rotation and use No mention (when probed)
[When DISCARD BY: date exceeded]	Rejection of device Mention rejection Mention when probed	Observed rotation and use No mention (when probed)
[When EXP DATE: exceeded]	Rejection of device Mention rejection Mention when probed	Observed rotation and use No mention (when probed)

^aFor this study, a single spray was considered acceptable; however, the instructions for use state that user should actuate the inhaler until an aerosol cloud is visible and then repeat the process three more times.

^bIf not used for more than 21 days, patients are to actuate the inhaler until an aerosol cloud is visible and then repeat the process three more times to prepare the inhaler for use.

pMDI

Task step	Acceptable	Unacceptable
Priming	Attempted	Ignored, skipped
Remove cap	Cap removed	Ignored, skipped
Check inside mouthpiece	Observable check	Ignored, skipped
Hold device with mouthpiece pointing away from you and others	Held in fume hood Held away from face/others	At point of activation... outside fume hood pointed at face/others
Shake inhaler	Observable shake ≥ 1 second	Ignored, skipped Shake < 1 second
Press down on top of inhaler (release puff)	Pressed sufficient to activate Pressed insufficient once	Ignored, skipped Pressed insufficient repeatedly
Repeat 3 more times (total 4)	Repeated 3 times Repeated 3–6 times	Ignored, skipped Repeated 2–3 times Repeated ≥ 6 times
Replace cap	Cap replaced	Ignored, skipped
[Reprime after 7 days non-use]	Observable recognition of ≤ 7 days Sprayed in fume hood Sprayed away from face/others	Ignored, skipped No recognition of 7 days Belief > 7 days Sprayed outside fume hood Sprayed pointed at face/others
Use	Attempted	Ignored, skipped
Remove cap	Cap removed	Ignored, skipped
Shake inhaler	Observable shake ≥ 1 second	Ignored, skipped Shake < 1 second
Breathe out fully from mouth	Any observable exhalation (audible, visible) [‘Fully’ not assessed]	Ignored, skipped
Close lips around mouthpiece	Observable seal of lips to mouthpiece	Observable gap(s) Other part of device
Inhale slowly through mouth	Observable slow inhalation (i.e., > 2 seconds) through mouth	Ignored/skipped Rapid inhalation (i.e., < 2 seconds) Observable nasal inhalation
AND		Inhalation stops before press No inhalation within 2 seconds of press
Press down on top of inhaler (release puff)	Pressed sufficient to activate Pressed insufficient once	Ignored, skipped Pressed insufficient repeatedly Pressed in wrong place

Remove mouthpiece	Mouth closed	Ignored, skipped Plume evident from device or mouth
AND		Observable exhalation
Hold breath for 10 secs	Observable breath hold >5 seconds	Ignored, skipped Exhalation after ≤ 5 seconds
Breathe out	Observable breath	Through device
Repeat 1 more times (total 2)	Repeated	Ignored, skipped No shake No exhalation No seal No/rapid inhalation No activation Repeated ≥ 2 times
Replace cap	Replaced	Ignored, skipped
Dispose		
[When dose indicator shows ≤ 20 i.e., red scale portion]	Mention reorder of new device Mention when probed	Ignored/skipped No mention (when probed)
[When dose indicator shows ≤ 0]	Rejection of device Mention rejection Mention when probed	Observed use No mention (when probed)
[When EXP DATE: exceeded]	Rejection of device Mention rejection Mention when probed	Observed use No mention (when probed)