

Inhalation Therapy

Matching Device and Patient

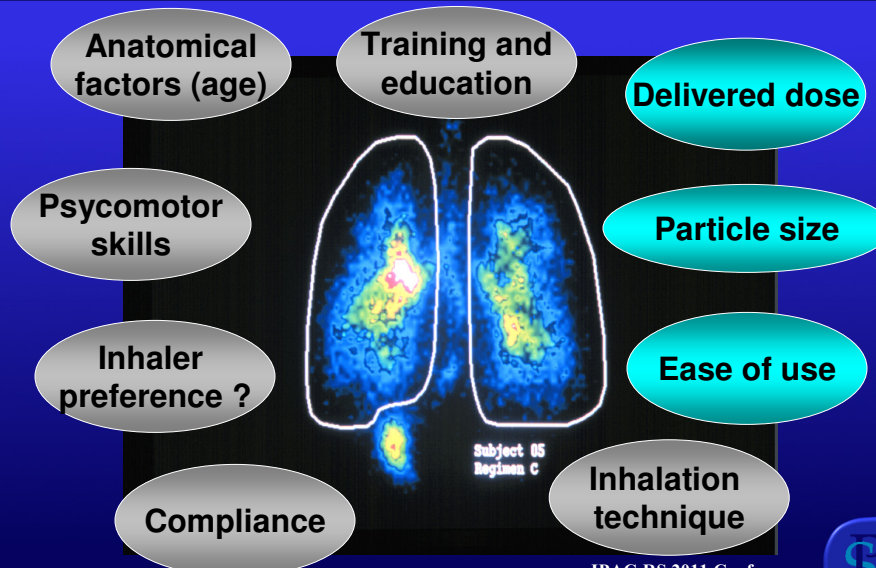
Matching Patient to the Device

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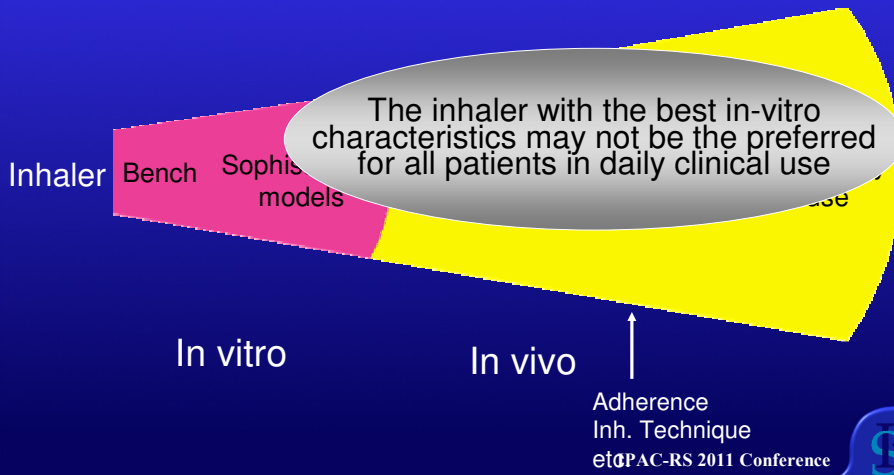


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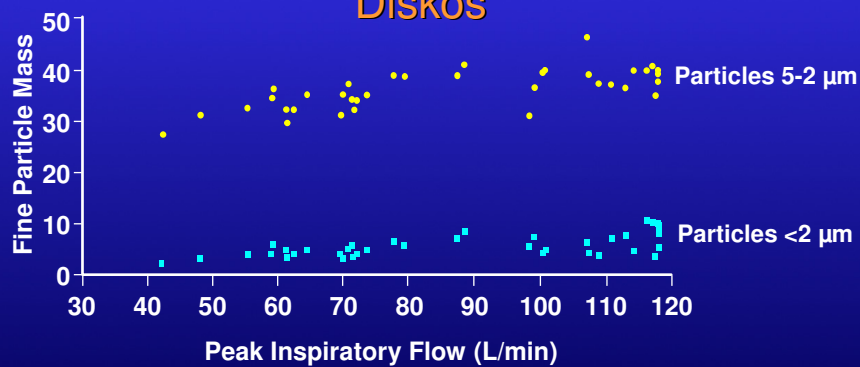
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Variations



Dry Powder Inhalers

Fine particle size distribution: Diskos

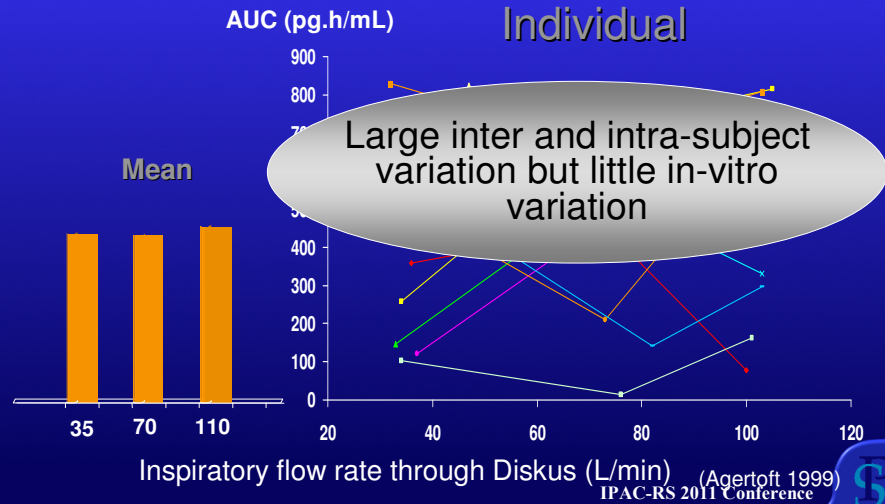


(Bisgaard et al, ERJ, 1998)

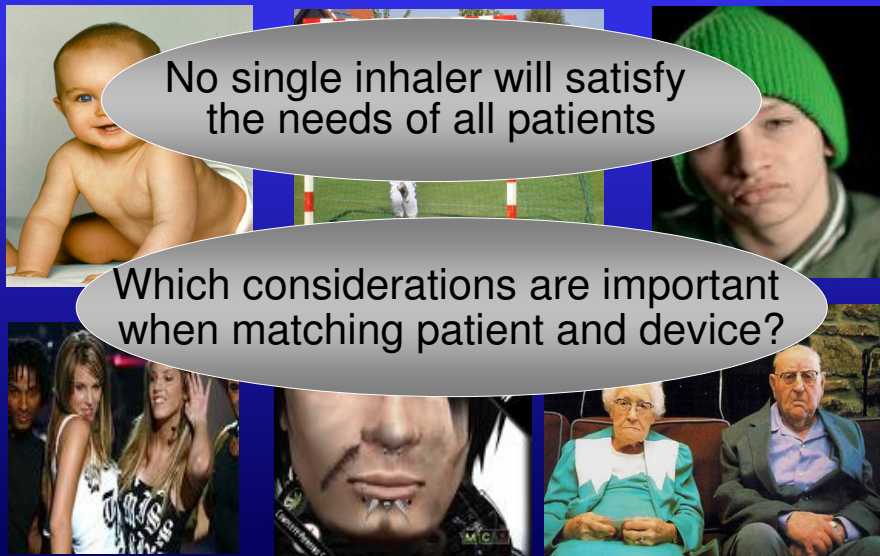
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Dry Powder Inhalers

Lung deposition and inspiratory flow rate



Matching Device and Patient



Matching Device and Patient

Important Considerations

- Ease of use
- Simple inhalation technique
- Convenience
- Drug delivered
- Price
- In-vitro characteristics

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>100 different inhalers available
It may be better for a clinician to focus on a limited number of inhalers to get better experience with the devices used
with each...

Most frequently used devices

- Pressurized metered dose inhalers (pMDI)
 - CFC and HFA
 - Breath-activated
- Spacer devices
- Dry powder inhalers (DPI)
- Nebulizers

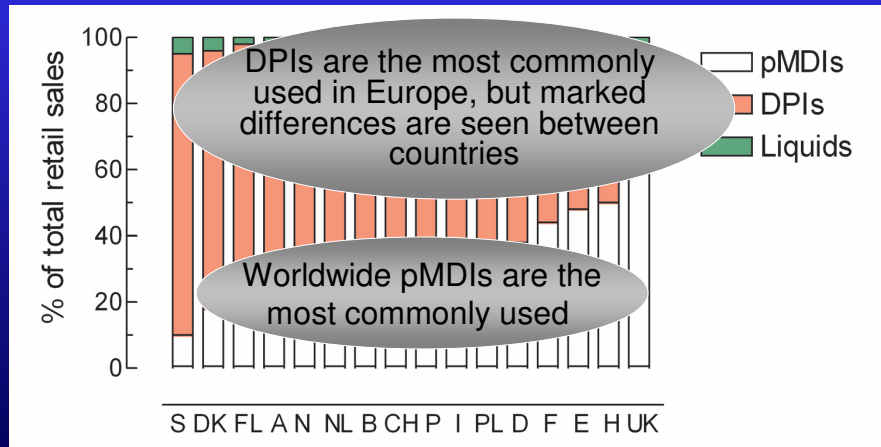
What's the most frequently used inhalers?

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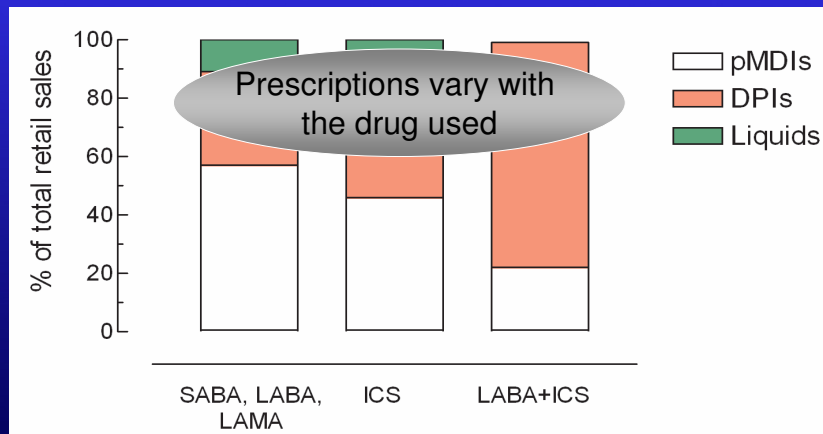
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Retail sales of inhalation devices in Europe

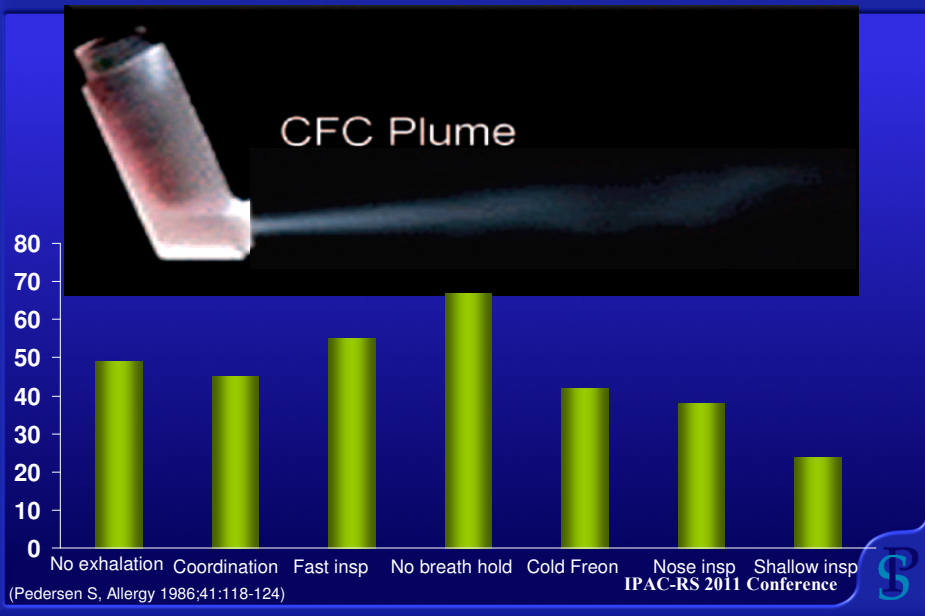


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Retail sales of inhalation devices in Europe



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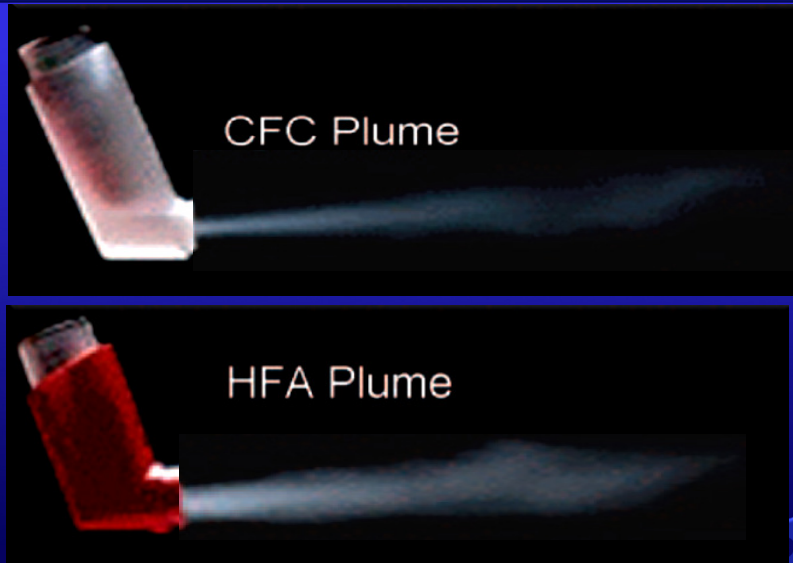


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Common problems with pMDIs

- No exhalation
 - No coordination
 - Co-ordination problems
 - Optimal timing
 - Cold freon effect
 - Inhalation through the nose
- Less than 50% of patients on regular treatment with a pMDI use it correctly
- The mistakes are similar in children and in adults, but generally more common in younger age groups and elderly people

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Inhalation Therapy in Children

Common problems with pMDIs

- No shaking
- No exhalation prior to inspiration
- Co-ordination problems
- Optimal inspiratory flow
- Bronchoconstriction (lubricants and CFCs)
- Cold freon effect
- Inhalation through the nose

HFA pMDI's



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Inhalation Therapy in Children

Most frequently used devices

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Inhalation Therapy in Children

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Effect of spacers



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Main problems with spacers

- Inconvenient

In young children differences in valve system, face mask, dead space and spacer volume are important – plus which pMDIs that can be used with the spacer

- Static electricity (device dependent)



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Inhalation Therapy in Children

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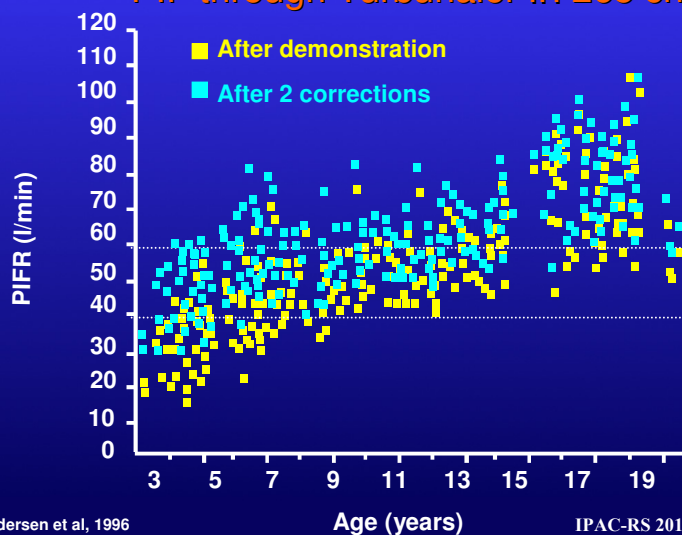
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PIFR through Turbuhaler in 265 children

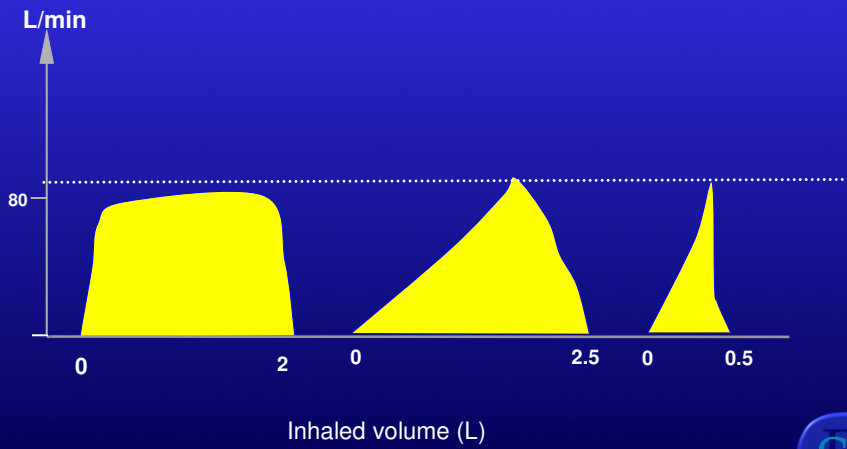


Pedersen et al, 1996

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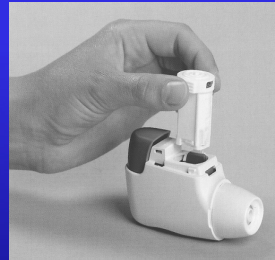
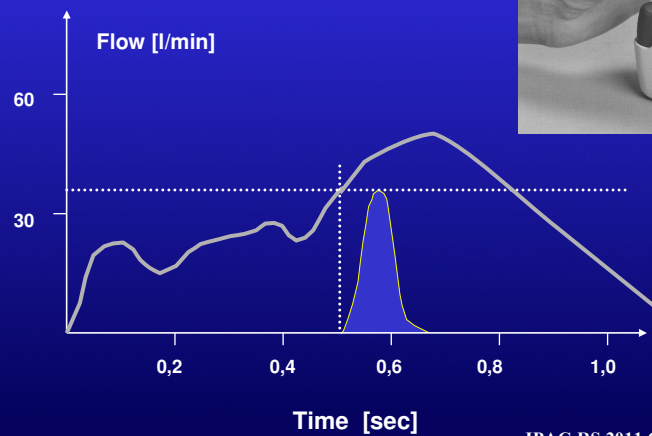
Inpiratory flow profiles through a DPI



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Inhalation Therapy in Children

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Effect DPI's



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Main problems with DPI's

- Exh Various inhalers have different design, strengths and weaknesses. This facilitates individualized therapy.
- Ins
- Loading
- "Slow-start" inhalation profile (device dependent)
- Humidity (device dependent)
- Dose counter (device dependent)

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Inhalation Therapy in Children

Inhaler Preference

- Inhaler preference studies are generally unreliable
- The device of the sponsoring company is always preferred
- The importance of inhaler preference for compliance and adherence is not known



Matching Device and Patient

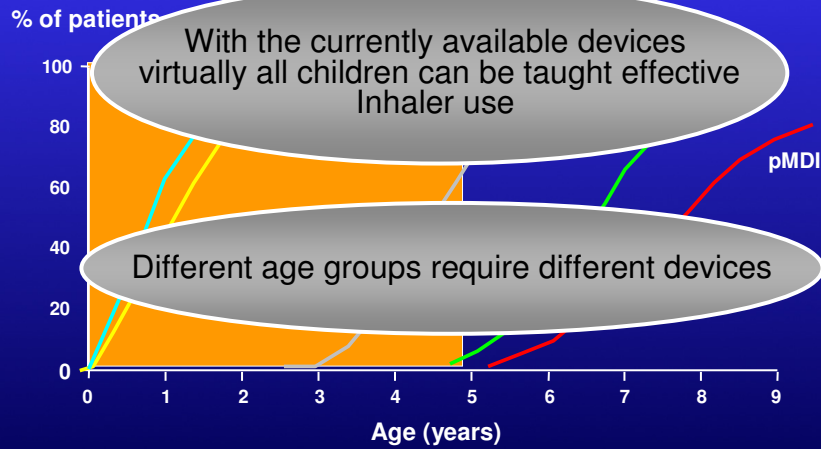
Summary

- The development of better inhalers has made effective drug delivery to the lungs possible in the majority of patients
- The main reasons for treatment failure are poor inhaler use and compliance with the therapy
- **What can we use for our daily choices?**
 - Choosing the right inhaler for the individual patient
 - Careful and repeated tuition and check of correct inhaler use at regular intervals



Matching Device and Patient

Correct inhaler use > 90% of time



With the currently available devices virtually all children can be taught effective Inhaler use

Different age groups require different devices

(Pedersen S et al. Prim Care Respir J. 2010; 19(3):209-16)



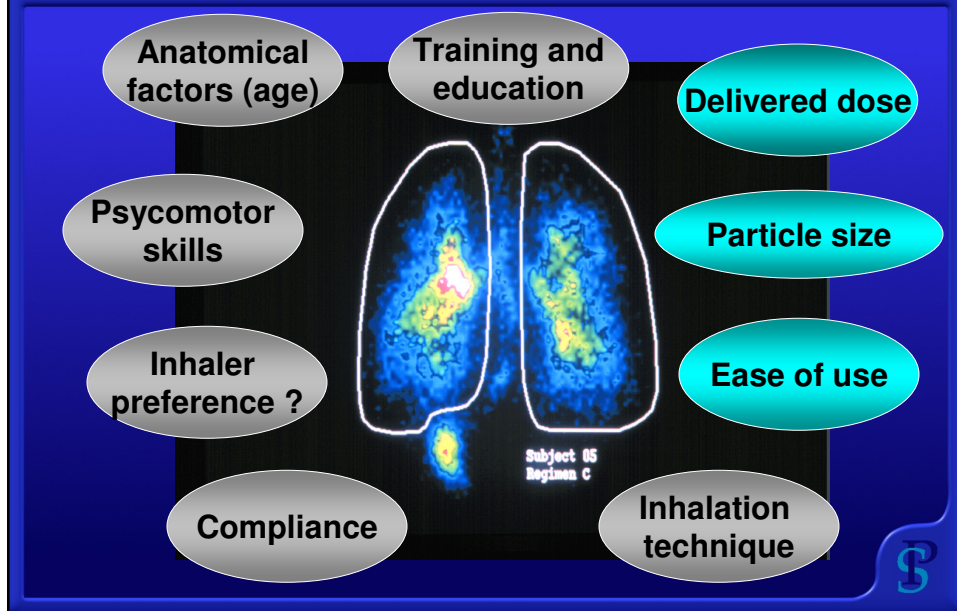
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Likelihood of correct inhaler use after tuition

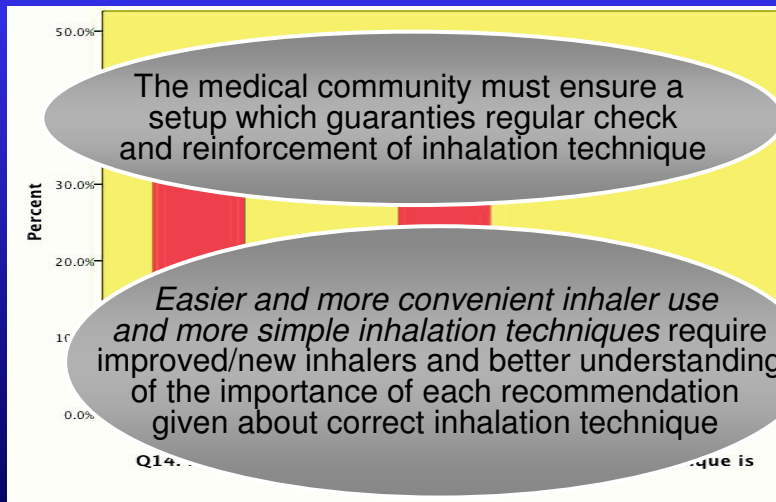
High	Spacer Nebulizer	DPI BA-pMDI Spacer Nebulizer	Spacer Nebulizer BA-pMDI
Medium	How can the current results be improved?		
Low	BA-pMDI pMDI		pMDI
	< 6 years	6 – 65 years	> 65 years



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Welcome technical developments

- MDIs

- Dose counters and adherence monitoring

- More breathers

- Telemetry

-

Focus should be redirected from in-vitro characterization to production and assessment of which inhalers are easiest to use correctly by various groups of patients and the importance of the individual steps in inhalation instructions

- Devices which do not require a sufficient inspiratory flow rate has been reached

- Teaching and handling aids (latter mainly for elderly and arthritis)

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