

Role of environmental counselling in allergy management and prevention

Jean-Marc RAME : MD PhD
Allergist, Coordinator of

Réseau d'Allergologie de Franche-comté
(Franche-Comté Allergology Network)

Pneumology Service University Hospital of Besançon

raft@chu-besancon.fr

What is a MIEC ?

MIEC : **M**edical **I**ndoor **E**nvironment **C**ounsellor

Is anybody collaborating with a MIEC ?

What is a MIEC ?

A MIEC is a professional who conducts home audits for patients who have a home-related illness.



A MIEC for which disease ?

- Initially : allergic diseases like rhinitis and asthma
- Other illnesses related to home environment :
 - Hypersensitivity pneumonitis
 - Severe immune deficiencies (mainly during treatment of hematologic disease)
 - Cystic fibrosis
 - All very severe asthmas ?



What is the role of a MIEC for allergic diseases ?

- **Way of improvement of allergic Rhinitis and/or asthma diagnosis by allergists :**

- **Clinical history** : increasing symptoms when allergen exposure is increasing

Can the allergist be sure to assess the actual exposure to allergens when interviewing the patient?

- **Sensitization makers** : Skin-test and/or IgE reactivity to allergen in serum (Improvement controlled by companies : molecular diagnosis but limited impact)

What is the role of a MIEC for allergic diseases ?

- **Way of improvement of allergic Rhinitis and/or asthma treatment by allergist :**

- Allergen avoidance

- Allergen Immunotherapy

- Symptomatic treatment

educational therapy

For both therapies, improvement is controlled by companies and is limited to severe asthma and to galenic for SIT

- Can the allergist be sure that allergen **avoidance is real** ?
- If symptoms persists, can the allergist be sure that environmental avoidance **cannot be improved** ?
- And what about **clinical efficacy** ?

What is the role of a MIEC for allergic diseases ?

- **MIEC is helping the allergist :**
 - To determine **environmental and especially allergen exposure**
 - To propose an optimal **environmental avoidance**
- **Why would environmental diagnosis and treatment be improved by a MIEC ?**



Why would environmental diagnosis and treatment be improved by a MIEC ?

- **MIEC will give a better appraisal to real exposure to allergen :**

- Can we really believe the pieces of information brought by the patient ?

Limits : affect, cultural and technical beliefs and misunderstandings...

Example : Do you have au ventilation ? Natural ventilation /single flow ventilation/double flow ventilation...and its maintenance ?

Why would environmental diagnosis and treatment be improved by a MIEC ? What is the best for indoor air quality ?



A detergent



Essential oil



Depolluting plant



...or opening windows each day : 15 minutes every morning and evening ?

In a house, are “wellness” and “being healthy” synonyms ?



Depolluting paint

What is the role of a MIEC for allergic diseases ?

- **MIEC is giving a more objective and standardized evaluation of patient allergen exposure and indoor air quality !**
- But can we demonstrate the efficacy of the MIEC's intervention for allergen avoidance more scientifically ?



Is an allergist working with a MIEC better than an allergist alone ?

Medical Indoor Environment Counselor (MIEC) : role in compliance with advice on mite allergen avoidance and on mite allergen exposure

378 patients from four centers (Marseille, Montpellier, Paris, Strasbourg)

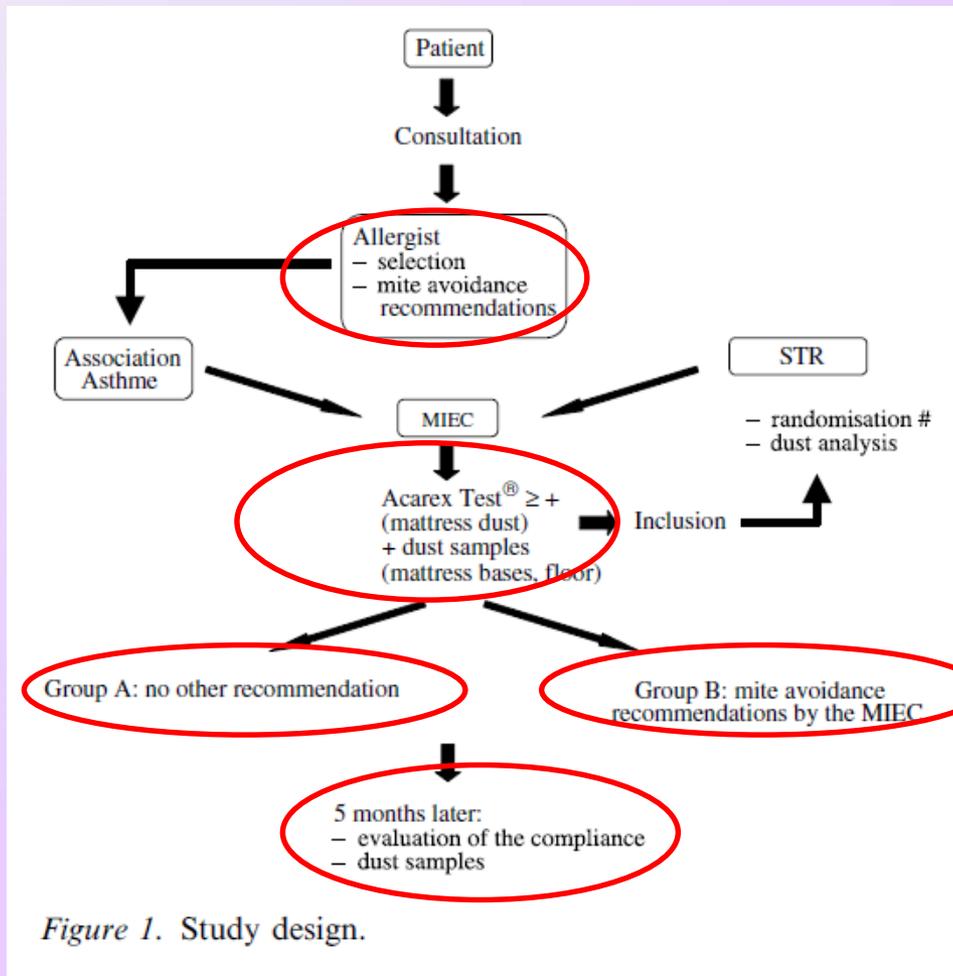


Figure 1. Study design.

F De BLAY et al Allergy 2003; 58: 27–33

Is an allergist working with a MIEC better than an allergist alone ?

Table 4. Initial and final levels of group 1 mite allergens ($\mu\text{g/g}$)

	Group A levels (mean (SEM))		Group B levels (mean (SEM))	
	Initial	Final	Initial	Final
Mattresses	67.7 (24.8)	46.3 (14.75)*	44.9 (5.9)§	20.5 (2.8)*
Mattress bases	107 (26.3)	106.5 (25.2)	83.8 (6.1)§	22.9 (4.2)†
Floors	14.5 (0.4)	12.2 (0.7)‡	15.8 (0.3)§	6.3 (0.2)

* Difference between initial and final dust-mite allergen levels in group A or in group B ($P = 10^{-5}$).

† Difference in dust mite allergen levels between group A and B of upholstered mattress bases ($P = 10^{-5}$).

‡ No significant difference between initial and final levels in group A and significant in group B ($P = 10^{-3}$).

§ No significant difference was found between initial mite allergen levels between group A and B in mattresses, mattress bases and floors.

Is an allergist working with a MIEC better than an allergist alone ?

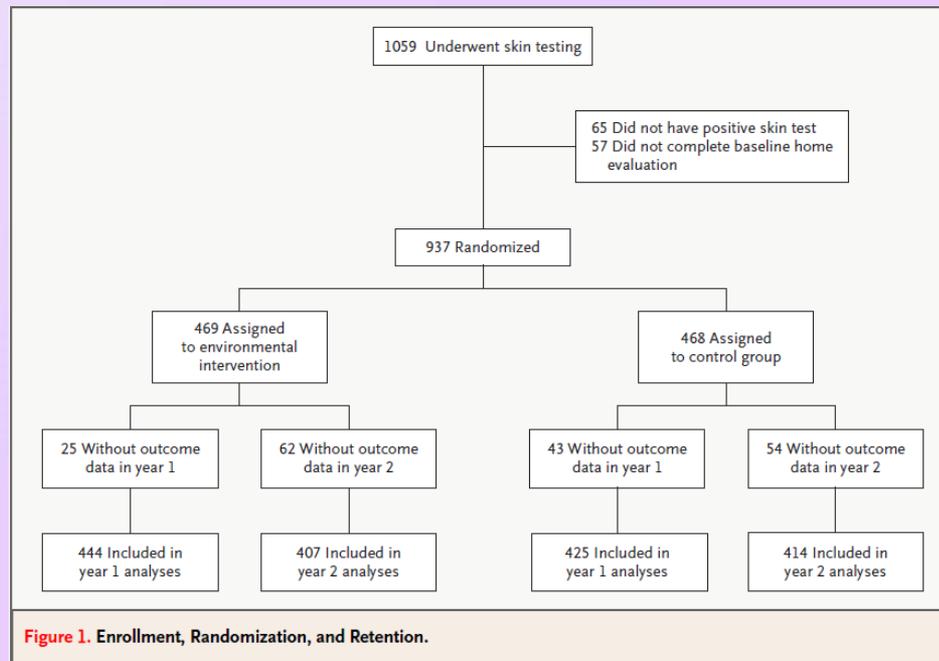
Conclusion: « our multicentre prospective study has shown that use of MIECs, acting together with the doctor, **increased compliance with mite allergen avoidance measures** and **decreased mite allergen exposure** from mattresses, upholstered mattress bases and carpets. **Lung specialists and allergists**, who are not necessarily aware of the patients' domestic environment, very **often give inadequate advice about allergen avoidance**. **Practitioners of this new occupational activity can effectively improve mite allergen avoidance** ».

But is it clinically efficient ?

Is a collaborative allergist and MIEC intervention clinically efficient ?

Results of a home-based environmental intervention among urban children with asthma

W J. Morgan et al : N Engl J Med 2004; 351:1068-1080



A very global avoidance of allergens (mites, cockroach, mould and pets) and irritants was performed !

Is a collaborative allergist and MIEC intervention clinically efficient ?

Results of a home-based environmental intervention among urban children with asthma

W J. Morgan et al : N Engl J Med 2004; 351:1068-1080

fewer symptoms of asthma :

- **Maximal number of days with symptoms** reduced
- **the greater reduction in asthma-related symptoms**
- Significant reductions in the disruption of caretakers' plans, caretakers' and children's lost sleep, and **school days missed significantly**
- **Fewer unscheduled asthma-related visits**

Is a collaborative allergist and MIEC intervention clinically efficient ?

Results of a home-based environmental intervention among urban children with asthma

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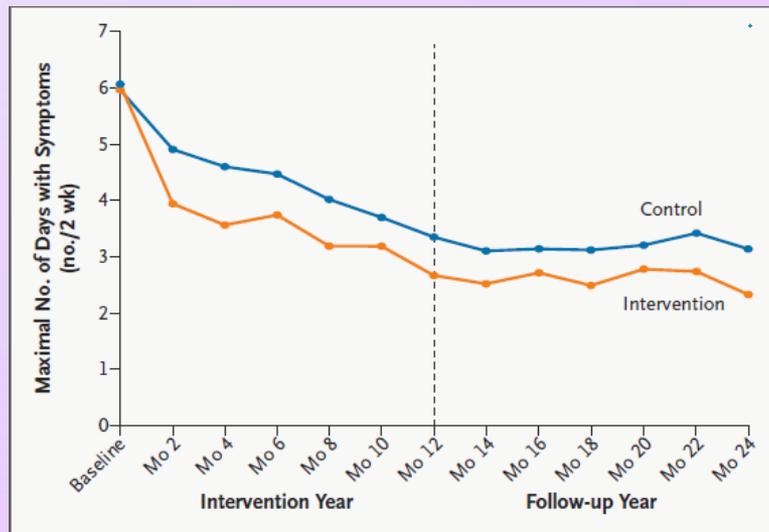


Figure 2. Mean Maximal Number of Days with Symptoms for Every Two-Week Period before a Follow-up Assessment during the Two Years of the Study.

The difference between the groups was significant in both the intervention year ($P < 0.001$) and the follow-up year ($P < 0.001$).

Conclusion : We have shown that remediation strategies can be implemented that result **in both sustained reductions in indoor allergen levels and sustained improvements in reported asthma-associated morbidity in this high-risk population.**

Is a collaborative allergist and MIEC intervention clinically efficient ?

- **Yes, but avoidance must be global !**
- Then, what is a global avoidance ?
 - Allergens : mites, pets, mould, (rarely cockroaches) ...
 - Irritants : tobacco, volatile organic compound (VOC) and particles...



Is a collaborative allergist and MIEC intervention clinically efficient ?

- **Environmental diagnosis and environmental avoidance will be more efficient** with a MIEC, whereas other possibilities of diagnosis or treatment improvement are modest !
- In addition to a better quality of care management, a **MIEC allows the allergist to free up time**, so that he will be able to see more patients !



Is a collaborative allergist and MIEC intervention clinically efficient ?

- **Our MIEC is regularly solicited to give informations about indoor air quality** : to insurance member's, in forum, to professionals...
- Our MIEC also propose an environmental education for hands dermatosis



Recommandations de la SPLF sur Asthme et Allergie : 2007

L'efficacité de l'éviction globale réalisée lors de visites à domicile par des techniciens en environnement a été démontrée chez l'enfant présentant un asthme allergique persistant sévère.

Il existait une corrélation entre l'amélioration clinique et l'importance de la réduction allergénique (NP3).

L'efficacité de l'éviction globale chez l'enfant présentant un asthme allergique persistant sévère a été démontrée (NP3).

Chez l'adulte, plusieurs études limitées ont démontré l'efficacité de l'éviction des allergènes d'acariens (NP4).

R34- Il est recommandé de faire une éviction des allergènes responsables, la plus globale possible, chez l'enfant allergique asthmatique (Recommandation de grade B). Bien qu'il n'y ait pas encore de données suffisantes chez l'adulte allergique asthmatique, l'éviction des allergènes est recommandée. (Recommandation de grade B).

R35- Lorsque l'éviction est proposée, il est recommandé une éviction la plus globale possible des acariens dans la chambre en cas d'asthme allergique aux acariens en fonction de la charge allergénique. (Recommandation de grade C).

R37- Il est recommandé d'évaluer la charge allergénique en acariens au domicile avant de proposer des mesures d'éviction. (Recommandation de grade C).



The MIEC in practice



- The allergist is assessing the **diagnosis of allergic rhinitis and/or asthma** (patient interview, SPT, IgE, spirometry...)
- **Allergist request the a MIEC's intervention :**
 - **Information** to the patient
 - **Redaction of a prescription** : clinical observation, environment, allergenic sensitization (SPT and IgE), goal of the visit
 - Transmission of the prescription to the MIEC : e-mail, letter, Fax

The MIEC in practice

- The MIEC gets in touch with the patient for :
 - A **short virtual phone “home audit”** (to determinate necessary equipment for the home visite)
 - **Fixing an appointment and sometime special conditions for the appointment** (mould sampling), search of chemical pollutants)



The MIEC in practice



- **Housing general parameters :**

- Individual or collective, orientation, altitude, number of floors, underground, number and type of rooms,
- area, date of construction, renovations, building materials, type of insulation,
- heating, ventilation and their maintenance and aeration, home cleaning
- Number of people, age, and their indoor activities, animals

The MIEC in practice

- **In each room :**

- Area of the room, temperature, hygrometry,
- Situation of the room : floor number, underground...
- Floor coverings, wall coverings, heating and ventilation point, room maintenance, aeration,
- Type, uses and age of the furniture, maintenance,
- Number of occupants/room,



The MIEC in practice

- **Specific questionnaire for kitchen and bathroom**
- **Relation between different rooms, communication between the rooms**



Visite

Patient Général Habitat Pièce de séjour Cuisine Salle de bain Chambre du patient autre char

Logement F1 F2 F3 F4 F5 Autres

Nombre de chambre Nbre Adultes 0 Nbre Enfants

Détails Année constr.

Superficie Nbre étage Année emm.

Travaux au cours des 12 derniers mois

Oui Achevés

Non En cours

Chambre Salon
 Peinture
 Tapiserie
 Isolation
 Sols
 Autres
 Ventilation

Description de la construction

Présence vide sanitaire Façade dégradée Gouttières endommagées

Présence d'une cave Fissures Vide ordure

Toiture en mauvais état Revêtement effrité Autres

Environnement (dans un rayon de 500m)

Aéroport Centrale ou usine Station service

Autoroute Cheminée de chauffage Route nationale

Pressing Exploitation agricole Voie fluviale

Gare routière Voie ferroviaire Autres

Chauffage

	Electricité	Bois	Charbo	Gaz	Fioul	Autres	
Central	<input type="checkbox"/>	Ramonage depuis moir					
Individuel	<input type="checkbox"/>	Puit canadien / proven					
Cheminée	<input type="checkbox"/>	Insert / poêle					
Au sol	<input type="checkbox"/>						
Chauff. d'appoint	<input type="checkbox"/>	Localisation <input type="text"/>					
Pompe à chaleur	<input type="checkbox"/>						

Ventilation

Oui Non Année d'installation

Ventilation naturelle Réglable on / off Obstruction

VMC simple flux 2 vitesses Salissure

VMC double flux Hygro-réglable En panne

Visite

Patient Général Habitat Pièce de séjour Cuisine Salle de bain Chambre du patient autre chambre autre salle Resultat prélevements Co

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Chauffage

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Central	<input type="checkbox"/>	Ramonage depuis moins d'un an <input type="checkbox"/>					
Individuel	<input type="checkbox"/>	Puit canadien / provençal <input type="checkbox"/>					
Cheminée	<input type="checkbox"/>	Insert / poêle <input type="checkbox"/>					
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Ventilation

Oui Non Année d'installation

Ventilation naturelle Réglable on / off Obstruction

VMC simple flux 2 vitesses Salissure

VMC double flux Hygro-réglable En panne

The MIEC in practice

- **Samples for measurements**

- Mite exposure
- Mould exposure (in winter)
- chemical pollutants (several times if necessary)
- Radon (in winter)



Survey of 1012 moldy dwellings by culture fungal analysis: Threshold proposal for asthmatic patient management

G Reboux et al : Indoor Air. 2018;1–12.

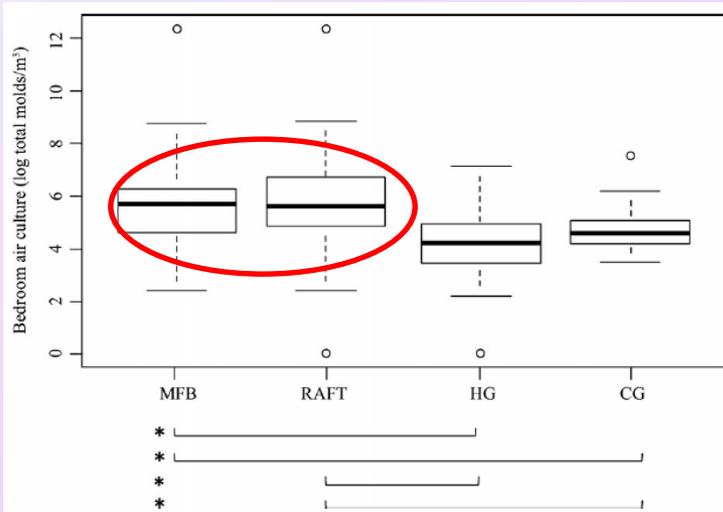


FIGURE 3 Comparison of total fungi concentrations in bedroom air between the four categories of dwellings. Kruskal-Wallis test between the different groups (RAFT, MFB, HG, CG): $P < 0.001$. * Homes with allergenic patients (RAFT and MFB) showed significant differences from those without allergenic people (HG and CG) (multiple comparison test). See Figure 2 for box-plot explanations



TABLE 5 Logistic regression model, adjusted odds ratios (aOR), and 95% confidence intervals (95% CIs) between asthma and microbial genera and species concentrations

Genera and species selected by model selection process ^a	Asthmatic dwelling: mean cfu/m ³ (SD)	Non asthmatic dwellings : mean cfu/m ³ (SD)	P-value	aOR (95% CIs)
<i>Cladosporium</i> spp.	517 (1843)	224 (1029)	0.020	1.12 (1.02-1.2)
<i>Aspergillus versicolor</i>	190 (551)	99 (355)	0.004	1.10 (1.03-1.19)
<i>Alternaria alternata</i>	3 (12)	2 (6)	0.046	1.21 (1.03-1.47)
<i>Aspergillus niger</i>	3 (10)	1 (7)	0.033	1.48 (1.03-2.21)

^aThe other genera and species included in the model before the stepwise backward selection process were *Aspergillus fumigatus*, *Aspergillus glaucus*, *Aspergillus nidulans*, *Aspergillus ochraceus*, *Penicillium* spp., *Walleria sebi*, *Rhodotorula* spp., and white yeasts. OR were adjusted on the other species included in the model.

The MIEC in practice

- After this exhaustive home evaluation (average of around 300 points/home), the MIEC will propose a **complete report** to the allergist and to the patient with a list of **recommendations !**
 - **Lab reports** and interpretation if necessary
 - Between 6 months and 1 year, the MIEC will make a **phone follow-up evaluation** :
 - symptom reduction
 - Follow-up of the recommendations
- A new report** will be proposed to the allergist and if necessary, **new recommendations** will be proposed.

➤ Exemple of MIEC intervention :

Patient allergic to mites, cat dander and who had many other complaints...

Great exposure to allergens but

Large collection of cleaning and do-it-yourself products !

No ventilation for oil tank !



=> High exposure to Ethylbenzène, o-xylène and Toluène

➤ Example of MIEC intervention :

Exposure to radon was measured during 4 winters in 151 patients homes in Franche-Comté

The 7 highest radon levels were always associated with houses with aeration/ventilation dysfunction and in most of them(6) a problem of moulds was found out.

Highest radon concentration is associated with increased home containment. So, several pollutants can be associated with radon, such as : allergens, moulds, chemicals.



Which working environment have we elaborated for our MIEC ?

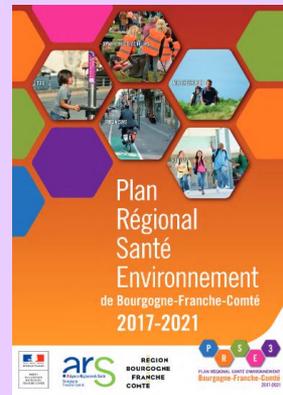
Technical environment :

- Access to **fungus analyses** and to fungal experts : toxicity of moulds ?
- Access to **chemical analysis** and toxicologists : to identify source of pollutants, possible toxicity of pollutants ?
- Access to **radon experts** : to identify source of pollutants and to correct building defaults.





Which working environment have we elaborated for our MIEC ?



Social environment :

- Whatever people are renters or owners, MIEC should be able to **counsel an adapted professional** => toward technical and financial counselling.
- The MIEC intervention has become a **regional health priority !**
- **A direct access of the MIEC to the allergist for frequent and regular discussion is necessary !**



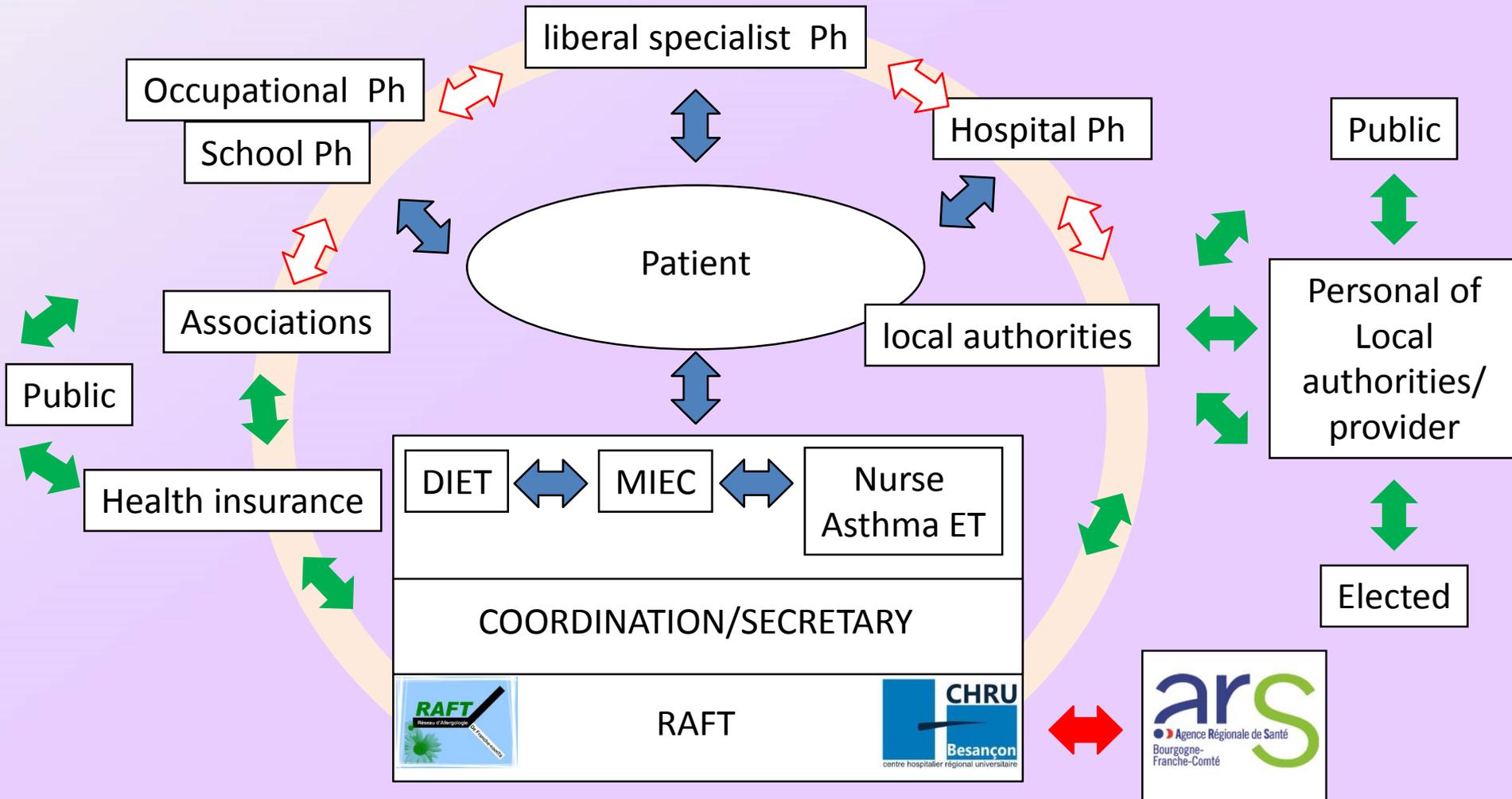
Which working environment have we elaborated for our MIEC ?

- MIEC is working at the “**Réseau d’Allergologie de Franche-comTé**”: RAFT (Franche-Comté Allergology Network)
- **RAFT is supported by University Hospital and financed by Regional Health Agency** (Agence Régionale de Santé)
- Then **access to the MIEC is free** for patient, but access is only given by a RAFT member **after au medical evaluation !**





Which working environment have we elaborated for our MIEC ?

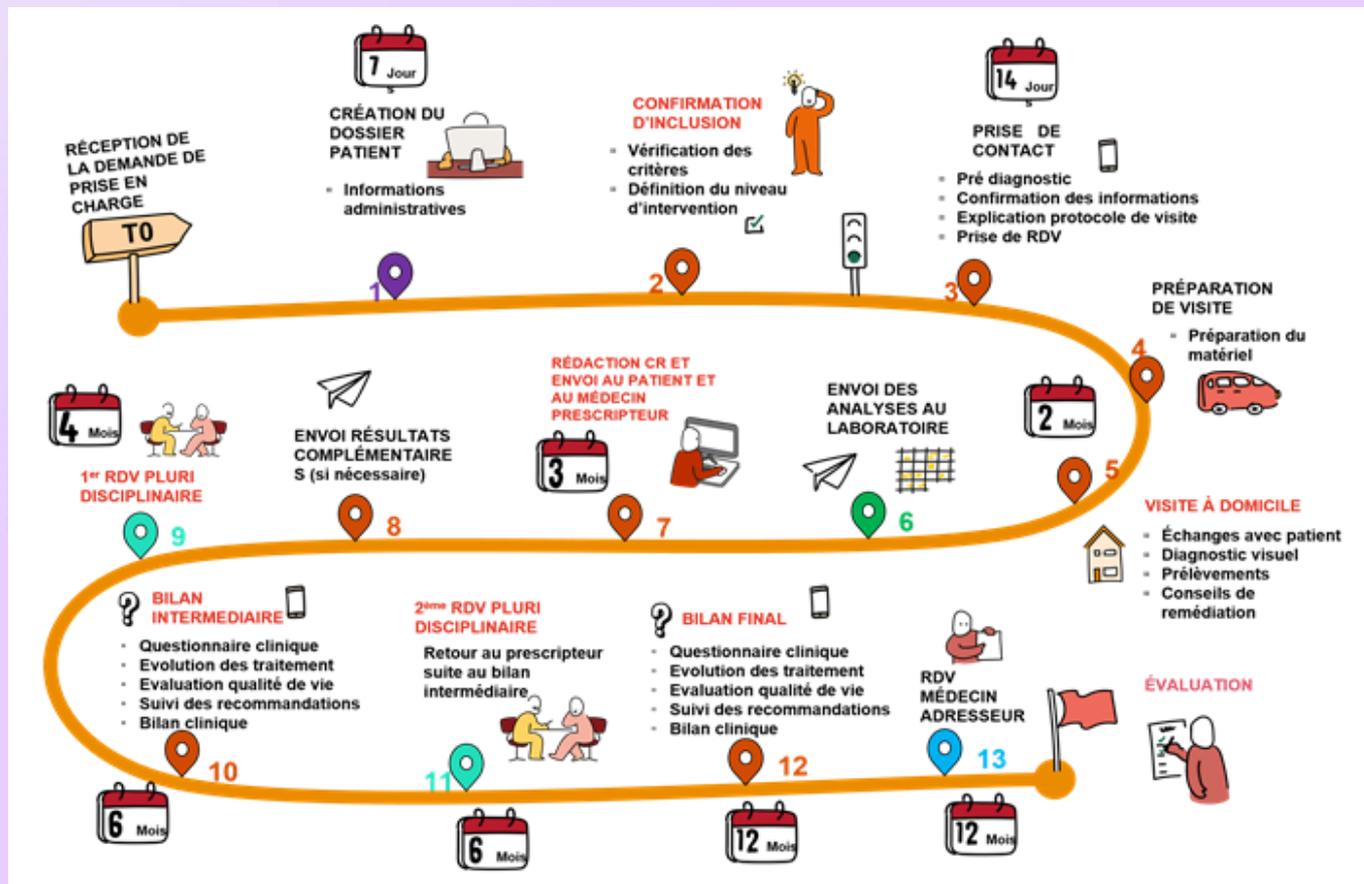


Can we do more ?

- MIEC are not recognized nowadays !
- Angèle project : “Allergies complexes : prise en charge Globale, diététique et environnementale “
- To elaborate and validate a **care pathway including the allergist and MIEC intervention**
- Type and cost of each care pathway will be **determined by sample complexity and their cost.**

Can we do more ?

- Care pathway including allergist and MIEC interventions :



Can we do more ?

- Ultimately, if these care pathways are validated, **they could be extended to other regions of France !**
- The “Angèle project”, proposes as well **care pathways for food allergic patients as well**, including a dietitian intervention
- Before the end of this month , we will know if health ministry accept to fund “Angèle project” ...

Conclusion

- Collaboration with a MIEC for an allergist, **is probably the most efficient way of progress both in diagnosis and treatment for indoor allergies !**
- Saving planet is a great nowadays challenge, but for home restauration, **a global and specialized vision is necessary**, if we don't want to promote any home related illness by majoring containment.
- **Then having access to a MIEC for an allergist should be an evidence !**



And here what could we do ?

Elaborate a physician group interested having access to MIEC services ?

Further information on the MIEC web-site :

<https://www.cmei-france.fr/>

RAFT experience



Study economical solution for an experiment ?

Local health authorities, insurances ?

You may present the RAFT model!



Elaborate working tools to build the project



Hire an experienced MIEC : <https://www.cmei-france.fr/>
or train a personnel to the MIEC job : Diplôme interuniversitaire de Santé respiratoire et habitat : Strasbourg University : 210 hours,
Phone : +33 3 68 85 49 23 or j.labarre@unistra.fr



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And start the experimentation !



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