Apport de la Spirométrie à domicile dans le suivi des pathologies respiratoires

Dr Isabelle Danner-Boucher

CRCM adulte de Nantes

Unité de Transplantation Thoracique

Avril 2021

l'institut du thorax

The Use of Home Spirometry in Detecting Acute Lung Rejection and Infection Following Heart-Lung Transplantation*

Babatunde A. Otulana, M.B.; Tim Higenbottam, M.D., F.C.C.P.; Lilie Ferrari, M.D.; John Scott, M.B.; Gilbert Igboaka, M.B.; and John Wallwork, M.B.

The value of home spirometry in detecting acute lung rejection and opportunistic infections was studied in 15 heart-lung transplant recipients over a six-month period. The patients measured their FEV_1 and FVC twice daily at home using a portable turbine spirometer. The records were then reviewed in relation to the results of transbronchial lung biopsy carried out during occurrences of respiratory symptoms and during routine posttransplant assessment. FEV_1 and FVC fell by a mean (±SD) of 10.4±6.9 percent and 9.3±7.9 percent, respectively, during 20 episodes of lung rejection. The corresponding figures during opportunistic infections were 12.8±10.1 percent and 12.5±14.3 percent. No such change was observed during routine normal biopsies. Regular home spirometry offered early detection of these complications allowing early transbronchial lung biopsy as well as assessing efficacy of their therapy. Above all, measurements can be made daily, which is unique in the assessment of solid organ transplants.

(Chest 1990; 97:353-57)

TBB = transbronchial lung biopsy; HLT = heart-lung transplant

UNIVERSITÉ DE NANTES

l'institut du thorax

Effect of Adherence to Home Spirometry on Bronchiolitis Obliterans and Graft Survival After Lung Transplantation

Christiane Kugler,[1,3] Thomas Fuehner,[2] Martin Dierich,[2] Claudia DeWall,[2] Axel Haverich,[1] Andre Simon,[1] Tobias Welte,[2] and Jens Gottlieb[2]

Background. Patient-controlled home spirometry (HS) after lung transplantation has been shown to be valid and reliable to detect the presence of graft infection and rejection at its earliest onset. Effects of nonadherence to HS on detection of the bronchiolitis obliterans syndrome (BOS) and on graft survival are unknown.
Methods. A 7-year prospective cohort study assessed nonadherence longitudinally using electronic spirometry for 24 months. During follow-up, BOS, retransplantation, and survival were stratified by adherence groups.
Results. Electronic monitoring of 226 patients confirmed that 123,487 measures were performed. Period prevalence was 0.76 measures per patient day and decreased significantly over time ($P<0.0001$). During follow-up, BOS was developed in 32% of patients; 5% received a second transplant, and mortality rate was 19%. Kaplan-Meier event-free analysis showed decreased freedom from BOS time in nonadherers (30%) compared with good (43%) or moderate adherers (19%) (log rank 6.008; $P<0.014$) and a tendency toward lower retransplantation rates (log rank 3.14; $P<0.07$). Mantel Cox regression revealed no impact of adherence on patient survival.
Conclusions. This was the first study assessing nonadherence to HS based on electronic monitoring in relation to long-term outcome after lung transplantation. Nonadherers showed decreased freedom from BOS in the largest sample to date, but did not impact survival.

Keywords: Lung transplantation, Home spirometry, Nonadherence, Outcomes.

(*Transplantation* 2009;88: 129–134)

UNIVERSITÉ DE NANTES

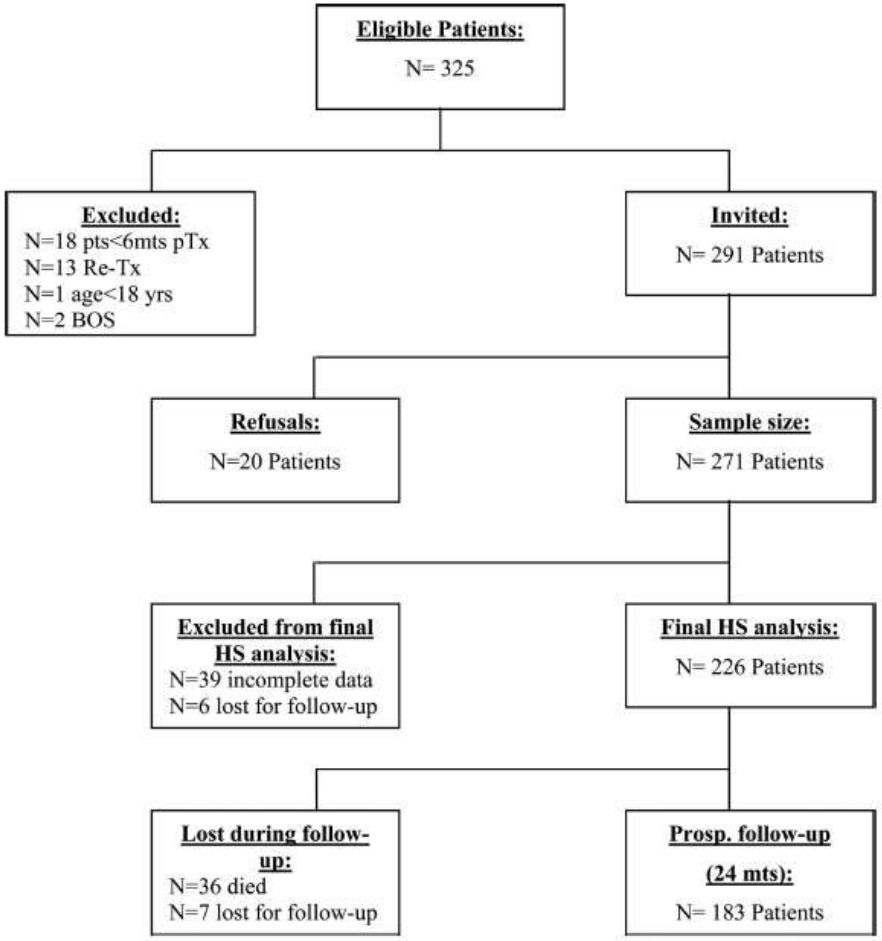
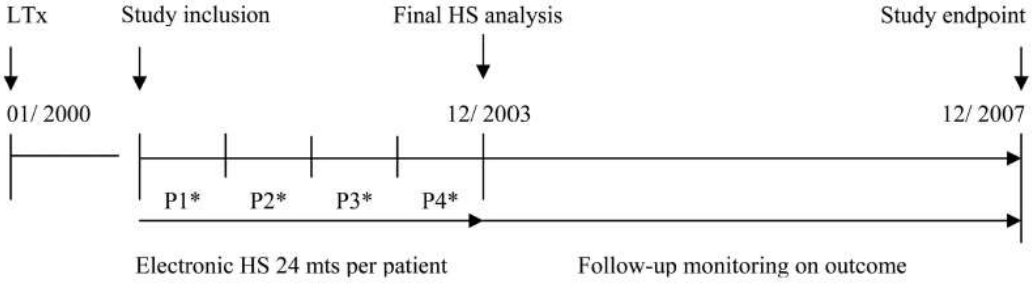


FIGURE 2. Flow chart of patient inclusion and follow-up.



Transplantation 2009;88:129-34

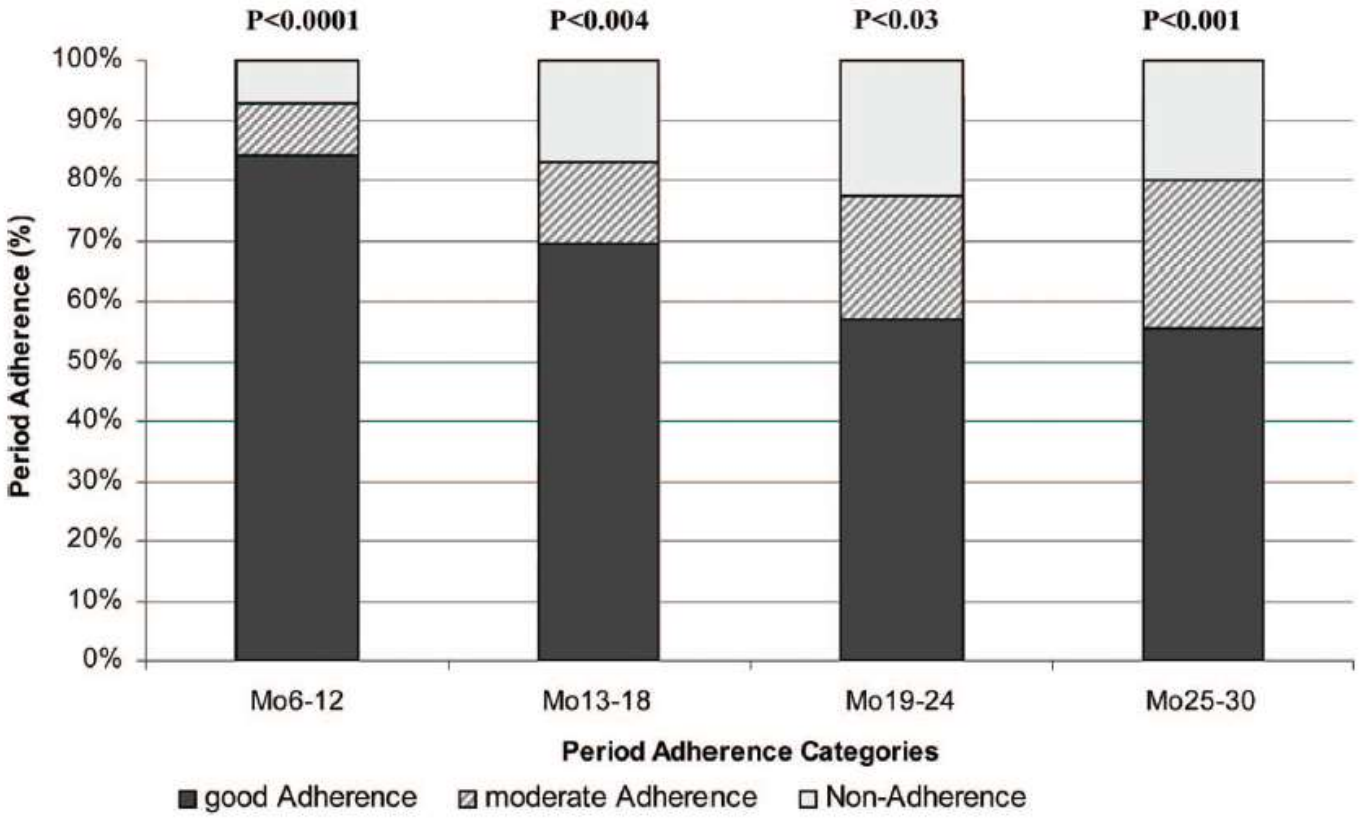
TABLE 1. Patient characteristics at study inclusion

Baseline characteristics (n=226)	
Age at transplant, median±SE (range) (yr)	46 ±0.7 (18–67)
Gender (female) (%)	50.4
Type of transplantation	
Bilateral (%)	72.5
Single (%)	16.0
Combined (heart-lung) (%)	11.5
Time since transplant median±SE (range) (mo)	7 ±0.3 (6–13)
Underlying disease	
COPD (%)	25.6
Idiopathic pulmonary fibrosis (%)	22.4
Cystic fibrosis (%)	21.5
Alpha 1 deficiency (%)	14.7
Others (%)	15.8
Best FEV_1, median±SE (range) (mL)	2610 ±47 (1000–5710)
Follow-up characteristics (n=183)	
BOS occurrence, median±SE (range) (mo)	34 ±1 (7–91)
Re-Transplantation, median±SE (range) (mo)	41 ±1 (7–92)
Death, median±SE (range) (mo)	42 ±1 (7–92)

COPD, chronic obstructive pulmonary disease; FEV_1, forced expiratory volume in 1 sec; BOS, bronchiolitis obliterans syndrome.

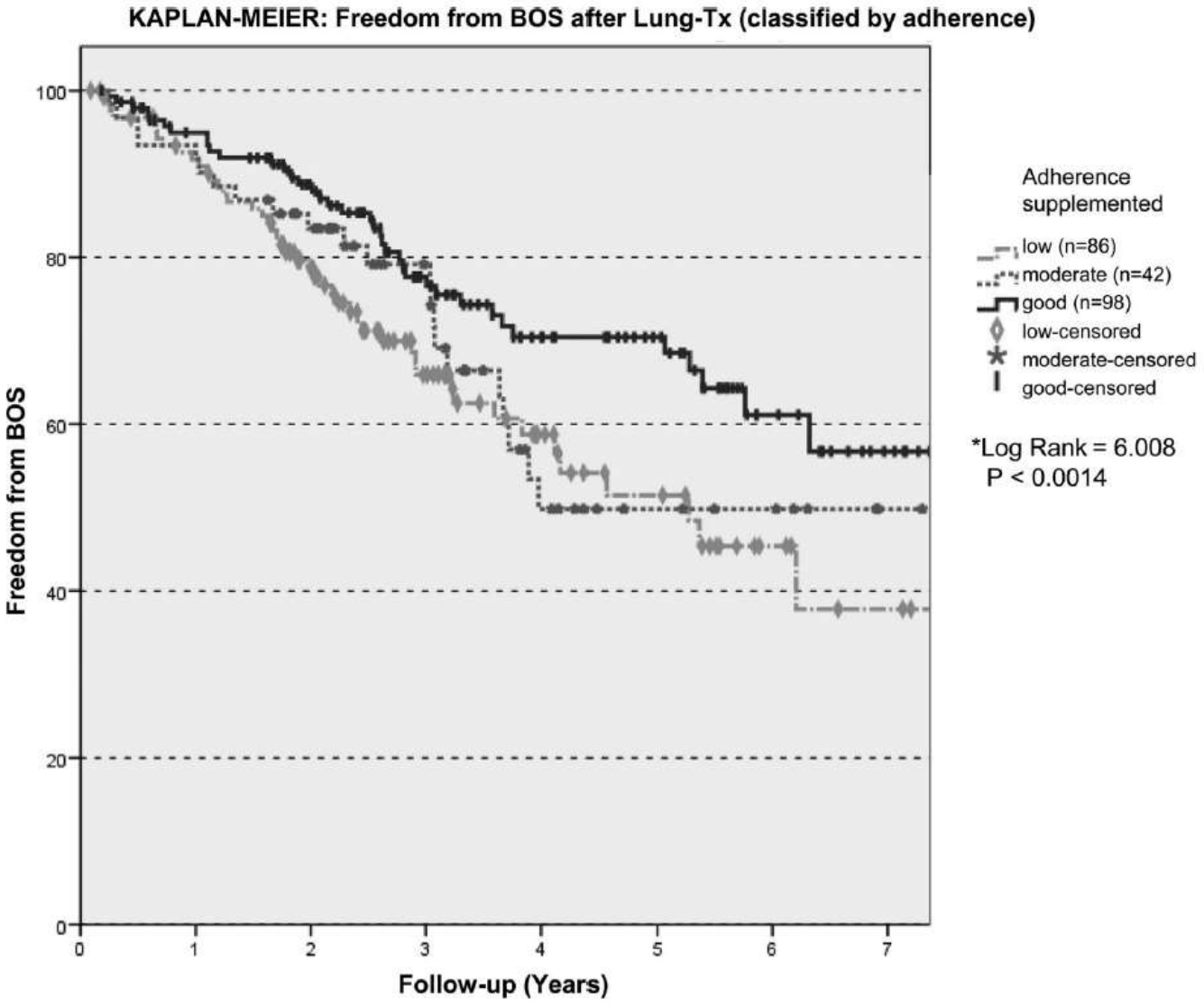
Transplantation 2009;88:129-34

Good adherer: patient performed greater than or equal to 80% of expected HS within a 6-month period.
Moderate adherer: patient performed greater than or equal to 50% to 79% of expected HS within a 6-month period.
Nonadherer: patient performed less than 50% of expected HS within a 6-month period.



*ANOVA; each period consists of six months monitoring

Transplantation 2009;88:129-34



*Log Rank Analysis (Mantel Cox Regression)

FIGURE 5. Freedom from BOS after LTx by adherence categories.

Transplantation 2009;88:129-34

Effect of Adherence to Home Spirometry on Bronchiolitis Obliterans and Graft Survival After Lung Transplantation

- Période de non utilisation de la spirométrie à domicile suivie de périodes d'utilisation quotidienne / périodes d'overobservance
- 31,9%de BOS,19,6% de décès, 4,8% retransplantations
- Non adhérence n'impacte pas clairement la survie sur la période d'étude de 7 ans mais augmente le risque de survenue d'une BOS
- 69,2% des retransplantations surviennent dans le groupe non adhérant vs 30,8% des bons observants
- Non adhérence à la spirométrie est probablement le reflet d'une moindre adhérance globale

Transplantation 2009;88:129-34

REVIEW

Improving survival outcomes in lung transplant recipients through early detection of bronchiolitis obliterans: Daily home spirometry versus standard pulmonary function testing

Kevin S Robson BMR RRT[1,2], Andrew J West MAppSc DipPH RRT[1]

KS Robson, AJ West. Improving survival outcomes in lung transplant recipients through early detection of bronchiolitis obliterans: Daily home spirometry versus standard pulmonary function testing. Can J Respir Ther 2014;50(1):17-22.

Améliorer la survie chez des greffés pulmonaires grâce au dépistage précoce de la bronchiolite oblitérante : la spirométrie quotidienne à domicile ou l'exploration fonctionnelle respiratoire standard

pathological process is irreversibly established. After examining the use of home spirometry in the largest study to date, it was found that BOS staging was detected notably sooner compared with clinic spirometric testing. Nonadherers did show decreased freedom from BOS, but it did not impact survival. Overall, home monitoring was shown to have a positive impact on survival, but was not statistically significant.

Eur J Health Econ (2017) 18:869–882
DOI 10.1007/s10198-016-0834-x

ORIGINAL PAPER

Health-economic evaluation of home telemonitoring for COPD in Germany: evidence from a large population-based cohort

Dmitrij Achelrod[1] · Jonas Schreyögg[1] · Tom Stargardt[1]

- Spiromètre si VEMS > 35%
- Spiromètre et saturomètre si VEMS <35%
- Mesures 2 fois/semaine avec appel si fréquence moindre et questionnaire qualité de vie (3 questions) pendant 1 an
- Appel toutes les 2 à 3 semaines pour éducation thérapeutique (diet, sport, tabac…)
- Algorythme calcule la probabilité d'exacerbation
- Appel par médecin si haut risque pour CAT

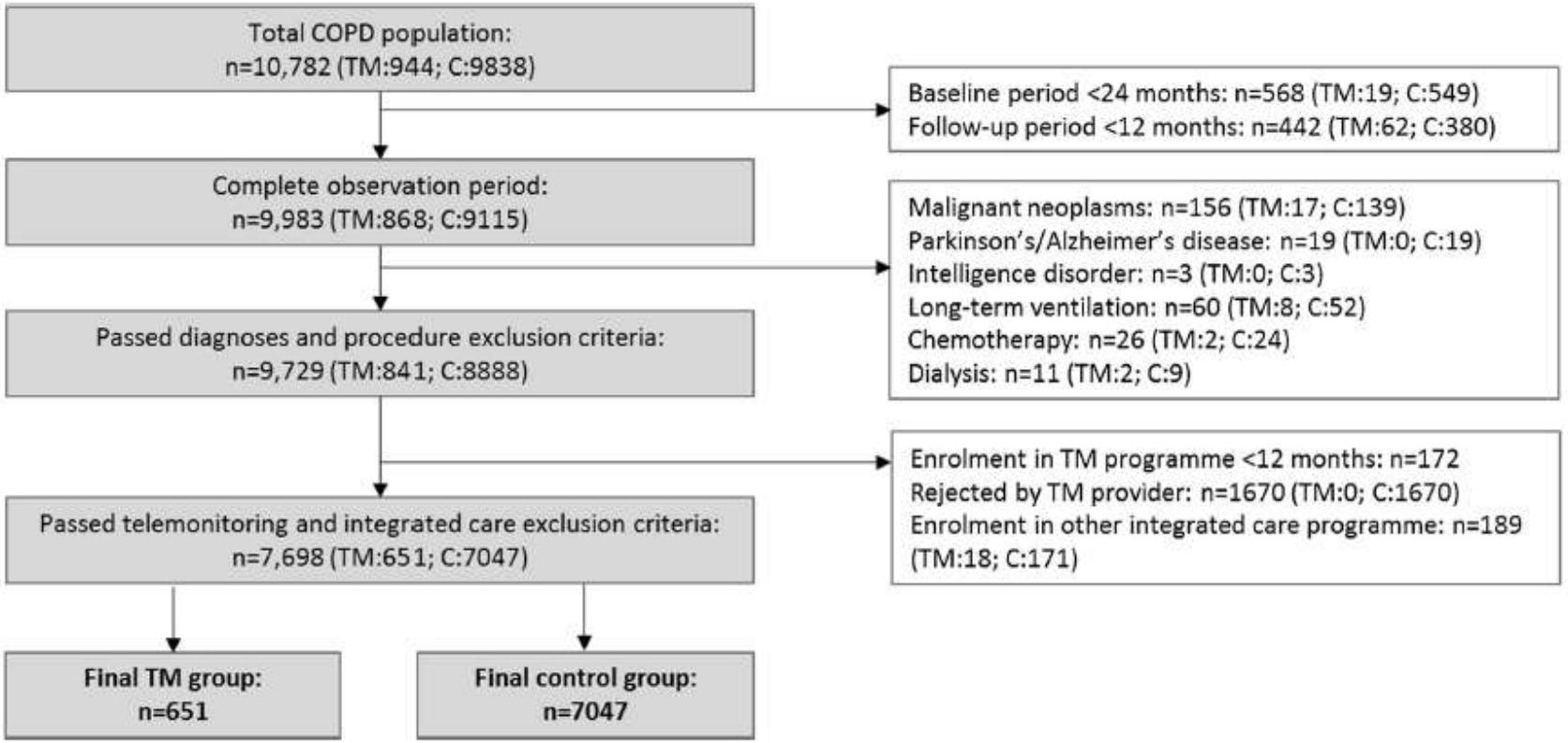


Fig. 1 Flow-chart showing algorithm for selection of study population

Table 2 Outcomes for the telemonitoring (TM) and control group in the baseline (2 years) and follow-up period (1 year) with the respective difference-in-difference estimator and its standard error (SE)

	TM (651)		Control (7047)		DiD estimation	
	Baseline	Follow-up	Baseline	Follow-up	ATT[a]	SE
Total costs (in €)	6799	8314	6961	9371	−895*	445
Inpatient treatment	3393	4296	3768	5727	−1056**	410
Thereof due to COPD	1431	1298	1478	1987	−642***	191
Outpatient treatment	1114	1288	994	1098	70*	35
Pharmaceuticals	2120	2496	2044	2328	92	94
Rehabilitation	171	234	155	218	0	42
Indicators for healthcare utilisation						
Average length of hospital stay	6.05	4.89	5.87	6.14	−1.44***	0.34
Thereof due to COPD	4.77	2.75	4.41	4.14	−1.76***	0.29
Inpatient bed days	9.87	9.97	11.28	14.47	−3.10***	0.82
Thereof due to COPD	4.74	3.39	4.77	5.48	−2.07***	0.40
Inpatient stays	1.09	1.06	1.15	1.34	−0.21***	0.06
Thereof due to COPD	0.51	0.36	0.49	0.52	−0.18***	0.04
Thereof ED visits due to COPD	0.31	0.21	0.28	0.33	−0.14***	0.03
Proportion hospitalized (in %)	93.86	50.23	87.32	58.85	−15.16***	2.36
Thereof due to COPD	74.81	22.27	64.40	32.13	−20.27***	2.53
Thereof in ED due to COPD	49.16	14.29	40.47	22.60	−17.00***	2.47
Physician visits	15.17	16.98	13.38	13.91	1.27***	0.26
Thereof due to COPD	6.09	8.08	5.29	6.42	0.86***	0.13
Prescriptions	36.72	41.49	34.93	38.04	1.67**	0.61
Indicators for mortality						
All-cause mortality (in %)	n.a.[b]	3.23	n.a.[b]	6.22	−2.99***	n.a.

* < 0.05; ** < 0.01; *** < 0.0001

[a] Average treatment effect for the treated represents excess resource utilisation attributable to DMP

[b] Baseline values are not applicable because individuals were only eligible if alive at index date

Health-economic evaluation of home telemonitoring for COPD in Germany: evidence from a large population-based cohort

- Patients sévères (VEMS <50% tirent plus de bénéfices en terme de mortalité, de cout et d'hospitalisation que les modérés (VEMS >50%)
- Corrélation entre variation journalière de la spirométrie et exacerbation mal connue donc existence d'alerte faussement positives
- Biais
- Diminution du cout (895,11 euros, p=0,04) mais cout du monitorage non inclus : matériel, personnel…
- Enrôlés volontaires dans le groupe télémédecine
- Education thérapeutique associée au monitorage : meilleure observance médicamenteuse, meilleure réactivité du patient

Au total

- Diminution du nombre et de la durée des hospitalisations mais augmentation des consultations externes et de la médication
- Diminution des exacerbations sévères et de la mortalité (3,23 vs 6,22%, p<0,0001) plus marquée chez les patients sévères

Eur J Health Econ (2017) 18:869–882

Hindawi
BioMed Research International
Volume 2020, Article ID 5040521, 9 pages
https://doi.org/10.1155/2020/5040521

Review Article

Telemonitoring Interventions in COPD Patients: Overview of Systematic Reviews

Xuanlin Li,[1,2,3] Yang Xie,[1,2,3] Hulei Zhao,[1,2,3] Hailong Zhang,[1,2,3] Xueqing Yu,[1,2,3] and Jiansheng Li[1,2,3]

[1]*Co-Construction Collaborative Innovation Center for Chinese Medicine and Respiratory Diseases by Henan & Education Ministry of China, Zhengzhou, Henan 450046, China*
[2]*Henan Key Laboratory of Chinese Medicine for Respiratory Disease, Henan University of Chinese Medicine, Zhengzhou, Henan 450046, China*
[3]*Department of Respiratory Diseases, The First Affiliated Hospital of Henan University of Chinese Medicine, Zhengzhou, Henan 450000, China*

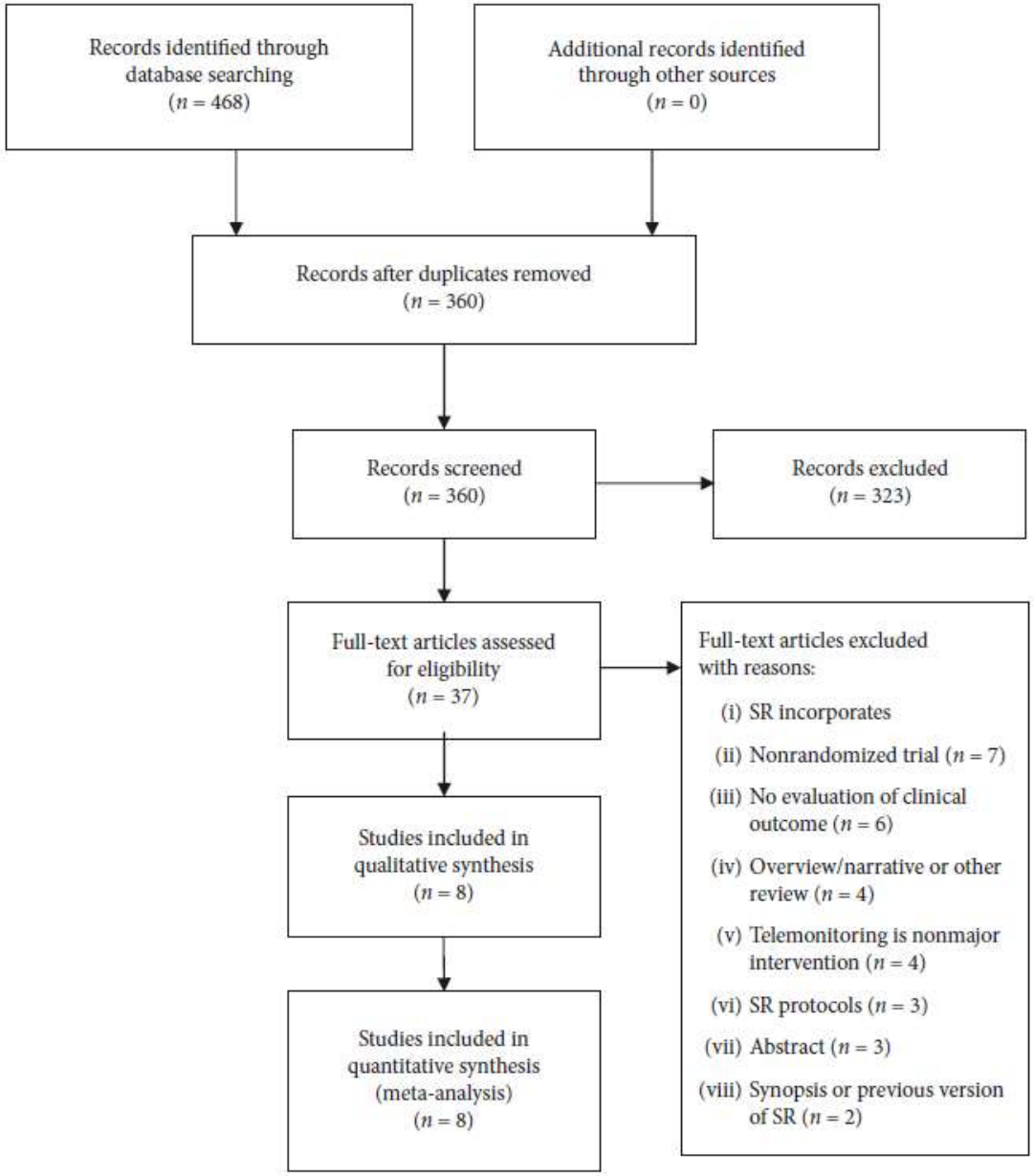


Figure 1: Study selection process for this overview.

l'institut du thorax

Table 1: Characteristics of the included reviews.

First author (years)	Databases searched	Country	No. of RCTs (no. of patients) included	Quality assessment for RCT/ non-RCT	Intervention (technology)	Control	Outcomes	Study type
Young et al, 2019 [16]	Ovid-Medline, Ovid-Embase, Cochrane Library	Korea	27 (3645)	Cochrane criteria	Telemonitoring (pulmonologist contact, telephone call, web-based exercise program)	Usual care (education self-care, clinical care, home exercises)	Mortality, emergency room visits, hospitalization, outpatient visits, length of stay, quality of life (SGRQ).	SR and MA
Yang et al, 2018 [17]	PubMed, Web of Science, Cochrane Library, Embase	China	6 (391)	Cochrane criteria	Mobile health applications (smartphones, networking/ monitoring systems)	Usual care	Hospitalization, average days of hospitalization, exercise capacity, and activity levels	SR and MA
Ah-Ram et al, 2018 [18]	Medline, Embase, Cochrane Central Register of Controlled Trials, CINAHL	Korea	28 (2891)	Cochrane criteria	Telemonitoring (self-management and support program, telerehabilitation intervention, teleconsultation, telecare)	Usual care (face-to-face care or telephone consultation)	Mortality, exacerbation rate, quality of life (SGRQ)	SR and MA
Deng et al, 2018 [19]	PubMed, Embase, Web of Science, Cochrane Library	China	10 (1037)	Cochrane criteria	Telephone support (web-based call, phone calls, self-management education)	Usual care (education session, ordinary care)	Exercise capacity (6WMD), quality of life (SGRQ)	MA
McCabe et al, 2017 [20]	CENTRAL, Medline, Embase, CINAHL, AMED, PsycINFO	Ireland	3 (557)	Cochrane criteria	Web 2.0-based interventions (PCs, apps, iPad, Android tablets, smart phones, Skype)	Usual care (face-to-face/hard copy/digital documentary educational/self-management support)	Hospitalization, exacerbation rate, quality of life (SGRQ), self-efficacy (COPD self-efficacy Scale), cost-effectiveness, exercise capacity (6MWD), lung function (FEV_1, FEV_1% predicted) anxiety and depression, sustained behavior change	SR and MA
Pedone et al, 2015 [21]	PubMed	Italy	12 (1129)	Cochrane criteria	Telemonitoring (web-based call center, video conference, home-telephone line, touch screen equipment)	Not report	Mortality, hospitalization, emergency room visits, quality of life (SGRQ), patients' satisfaction	SR
Lundell et al, 2015 [22]	CENTRAL, PubMed, CINAHL, AMED, PsycINFO, Web of Science, Scopus, PEDro	Sweden	9 (982)	Cochrane criteria	Tele-healthcare (phone calls, web-based call, phone reminders, Skype)	Usual care (optimized medication, ordinary healthcare contacts)	Physical activity level, physical capacity (6MWD), dyspnea	SR and MA
McLean et al, 2011 [23]	CENTRAL, Medline, Embase, CINAHL, AMED, PsycINFO	UK	12 (1004)	Cochrane criteria	Tele-healthcare (telephones, video cameras, internet to communicate with a nurse or doctor)	Usual care (universal health program, advice face-to-face, education and home visits, standard home healthcare)	Mortality, exacerbation rate, quality of life (SGRQ), emergency room visits, hospitalization, lung function (FEV1, FVC), patient satisfaction, study withdrawal, cost, cost-effectiveness	SR and MA

SR: systematic review; MA: meta-analysis.

UNIVERSITÉ DE NANTES

Table 3: Quality of evidence in included reviews with GRADE.

Outcome	Systematic review	N/n	Effect (95%)	GRADE					
				Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Quality of evidence
Mortality outcomes									
Mortality	Hong and Lee [16]	8 (1518)	RR 0.85 [0.64, 1.13]	−2	−1	0	0	0	L
	Sul et al. [18]	7 (919)	RR 0.89 [0.60, 1.34]	−1	−1	0	0	0	L
	McLean et al. [23]	3 (503)	RR 1.05 [0.63, 1.75]	−1	0	0	−1	0	L
Exacerbation outcomes									
Hospitalizations	Hong and Lee [16]	14 (2007)	RR 0.88 [0.80, 0.97]	−1	−1	0	0	0	L
	McCabe et al. [20]	1 (239)	OR 1.60 [0.80, 3.20]	−1	—	0	−1	0	L
	McLean et al. [23]	4 (604)	OR 0.46 [0.33, 0.65]	−1	0	0	0	0	M
Exacerbation rate	Sul et al. [18]	6 (NR)	RR 0.67 [0.31, 1.42]	−1	0	0	−1	0	L
	McCabe et al. [20]	1 (239)	OR 1.40 [0.70, 2.80]	−1	—	0	−1	0	L
Emergency room visits	Hong and Lee [16]	11 (1282)	RR 0.63 [0.55, 0.72]	−1	−1	0	0	0	L
	McLean et al. [23]	3 (449)	OR 0.27 [0.11, 0.66]	−1	0	0	−1	0	L
Quality of life									
SGRQ total scores	Hong and Lee [16]	4 (604)	MD −0.21 [−3.29, 2.86]	−1	0	0	−1	0	L
	Sul et al. [18]	9 (522)	MD 0.14 [−3.96, 4.23]	−1	−1	0	−1	0	VL
	Deng et al. [19]	6 (712)	SMD −0.36 [−0.51, 0.06]	−1	−1	0	0	0	L
	McCabe et al. [20]	3 (472)	MD −0.22 [−0.40, −0.03]	−1	−1	0	0	0	L
	McLean et al. [23]	2 (253)	MD −6.57 [−13.62, 0.48]	−1	−1	0	−1	0	VL
Exercise capacity									
6MWD	Deng et al. [19]	7 (570)	SMD 0.30 [0.00, 0.60]	−1	−1	0	0	0	L
	Lundell et al. [22]	5 (NR)	MD −1.3 [−8.10, 5.50]	−1	−1	0	−1	0	VL

NR: not reported; -2: very serious; -1: serious; 0: not serious; /: inapplicability; VL: very low; L: low; M: moderate.

Daily Home Spirometry: An Effective Tool for Detecting Progression in Idiopathic Pulmonary Fibrosis

Anne-Marie Russell[1,2], Huzaifa Adamali[3], Philip L. Molyneaux[1,2], Pauline T. Lukey[4], Richard P. Marshall[4], Elisabetta A. Renzoni[1,2], Athol U. Wells[1,2], and Toby M. Maher[1,2]

[1]National Institute for Health Research Biomedical Research Unit, Royal Brompton Hospital, London, United Kingdom; [2]Fibrosis Research Group, National Heart and Lung Institute, Imperial College London, London, United Kingdom; [3]Bristol Interstitial Lung Disease Service, North Bristol Lung Centre, Southmead Hospital, Westbury-on-Trym, United Kingdom; and [4]Fibrosis and Lung Injury DPU, GlaxoSmithKline R&D, Stevenage, Herts, United Kingdom

ORCID ID: 0000-0001-7192-9149 (T.M.M.).

Abstract

Rationale: Recent clinical trial successes have created an urgent need for earlier and more sensitive endpoints of disease progression in idiopathic pulmonary fibrosis (IPF). Domiciliary spirometry permits more frequent measurement of FVC than does hospital-based assessment, which therefore affords the opportunity for a more granular insight into changes in IPF progression.

Objectives: To determine the feasibility and reliability of measuring daily FVC in individuals with IPF.

Methods: Subjects with IPF were given handheld spirometers and instruction on how to self-administer spirometry. Subjects recorded daily FEV_1 and FVC for up to 490 days. Clinical assessment and hospital-based spirometry was undertaken at 6 and 12 months, and outcome data were collected for 3 years.

Measurements and Main Results: Daily spirometry was recorded by 50 subjects for a median period of 279 days (range, 13–490 d). There were 18 deaths during the active study period. Home spirometry showed excellent correlation with hospital-obtained readings. The rate of decline in FVC was highly predictive of outcome and subsequent mortality when measured at 3 months (hazard ratio [HR], 1.040; 95% confidence interval [CI], 1.021–1.062; $P \leqslant 0.001$), 6 months (HR, 1.024; 95% CI, 1.014–1.033; $P < 0.001$), and 12 months (HR, 1.012; 95% CI, 1.007–1.016; $P = 0.001$).

Conclusions: Measurement of daily home spirometry in patients with IPF is highly clinically informative and is feasible to perform for most of these patients. The relationship between mortality and rate of change of FVC at 3 months suggests that daily FVC may be of value as a primary endpoint in short proof-of-concept IPF studies.

Keywords: interstitial lung disease; clinical trials; biomarker; personalized medicine

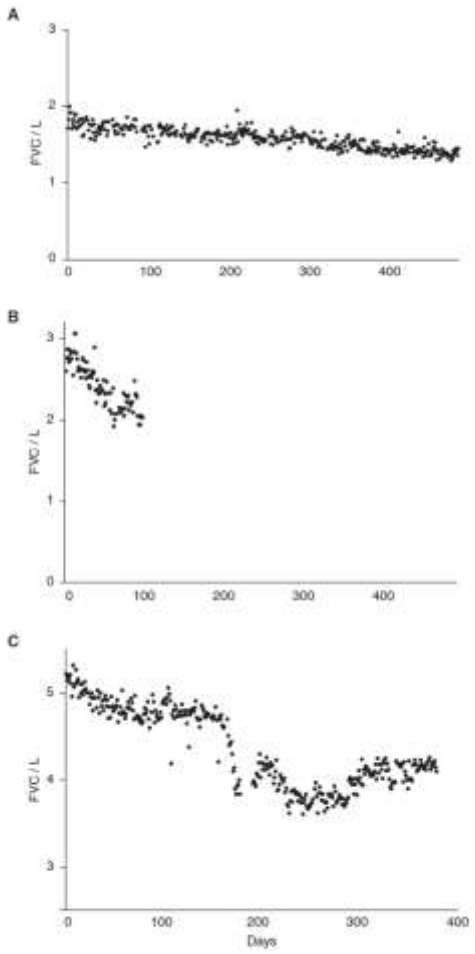


Figure 2. Individual examples of disease behavior. Daily FVC measurements for subjects with (*A*) inexorably progressive disease, (*B*) rapidly progressive disease, and (*C*) an acute exacerbation. Each point represents a single FVC measurement. The subject in *A* died of respiratory failure at 725 days. The subject in *B* died at Day 202, and the subject in *C*, despite losing 20% of FVC in a 3-week period, survived until Day 952.

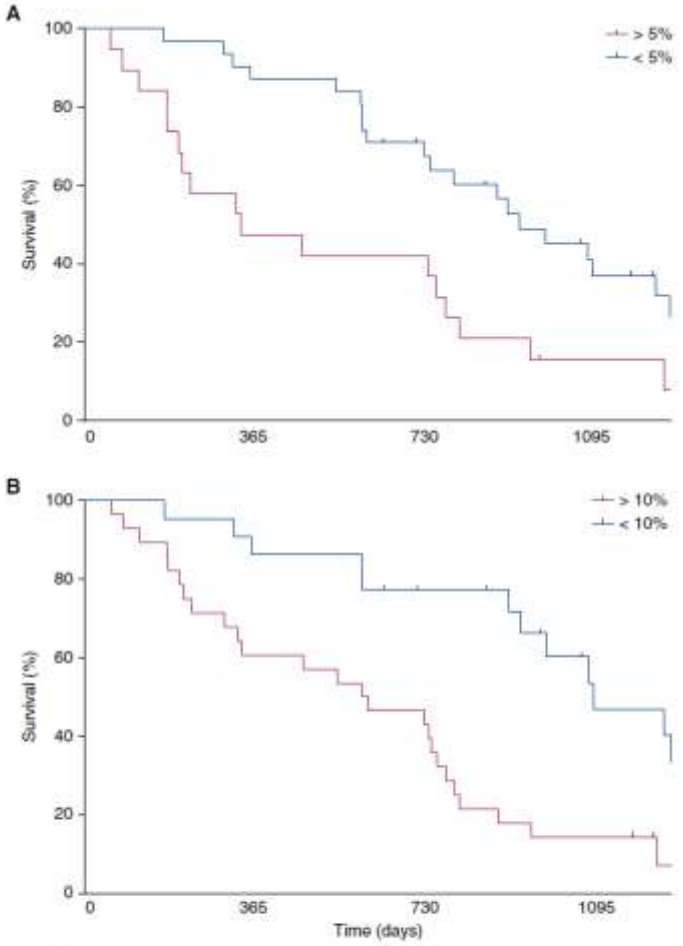


Figure 4. Relationship between 3- and 12-month rate of FVC change and subsequent survival. Kaplan–Meier plots demonstrate the effect of rate of change in FVC on subsequent survival at (*A*) 3 months and (*B*) 12 months. At 12 months, subjects were dichotomized into those with >10% rate of decline in FVC (*red line*) (n = 28) or <10% FVC rate of change (*blue line*) (n = 22). At 3 months, subjects were dichotomized into those with >5% rate of change in FVC (*red line*) (n = 19) or <5% rate of change in FVC (*blue line*) (n = 31). Rate of change was calculated by linear regression analysis of all points between baseline and 3 and 12 months, respectively. Rate of change is reported relative to baseline values, which were calculated by taking the mean of all the daily readings recorded by subjects during the first 7 days of the study.

Veit et al. Respiratory Research (2020) 21:270
https://doi.org/10.1186/s12931-020-01524-8

Respiratory Research

RESEARCH Open Access

Variability of forced vital capacity in progressive interstitial lung disease: a prospective observational study

Tobias Veit[1,2], Michaela Barnikel[1,2], Alexander Crispin[3], Nikolaus Kneidinger[1,2], Felix Ceelen[1,2], Paola Arnold[1,2], Dieter Munker[1,2], Magdalena Schmitzer[1,2], Jürgen Barton[1,2], Sanziana Schiopu[1,2], Herbert B. Schiller[2], Marion Frankenberger[2], Katrin Milger[1,2], Jürgen Behr[1,2,4], Claus Neurohr[5] and Gabriela Leuschner[1,2*]

Abstract

Background: Fibrotic interstitial lung disease (ILD) is often associated with poor outcomes, but has few predictors of progression. Daily home spirometry has been proposed to provide important information about the clinical course of idiopathic pulmonary disease (IPF). However, experience is limited, and home spirometry is not a routine component of patient care in ILD. Using home spirometry, we aimed to investigate the predictive potential of daily measurements of forced vital capacity (FVC) in fibrotic ILD.

Methods: In this prospective observational study, patients with fibrotic ILD and clinical progression were provided with home spirometers for daily measurements over 6 months. Hospital based spirometry was performed after three and 6 months. Disease progression, defined as death, lung transplantation, acute exacerbation or FVC decline > 10% relative was assessed in the cohort.

Results: From May 2017 until August 2018, we included 47 patients (IPF $n = 20$; non-IPF $n = 27$). Sufficient daily measurements were performed by 85.1% of the study cohort. Among these 40 patients (IPF $n = 17$; non-IPF $n = 23$), who had a mean ± SD age of 60.7 ± 11.3 years and FVC 64.7 ± 21.7% predicted (2.4 ± 0.8 L), 12 patients experienced disease progression (death: $n = 2$; lung transplantation: $n = 3$; acute exacerbation: $n = 1$; FVC decline > 10%: $n = 6$). Within the first 28 days, a group of patients had high daily variability in FVC, with 60.0% having a variation ≥5%. Patients with disease progression had significantly higher FVC variability than those in the stable group (median variability 8.6% vs. 4.8%; $p = 0.002$). Cox regression identified FVC variability as independently associated with disease progression when controlling for multiple confounding variables (hazard ratio: 1.203; 95% CI:1.050–1.378; $p = 0.0076$).

Conclusions: Daily home spirometry is feasible in IPF and non-IPF ILD and facilitates the identification of FVC variability, which was associated with disease progression.

Keywords: Interstitial lung disease, Idiopathic pulmonary fibrosis, Home spirometry, Forced vital capacity, Variability, Disease progression

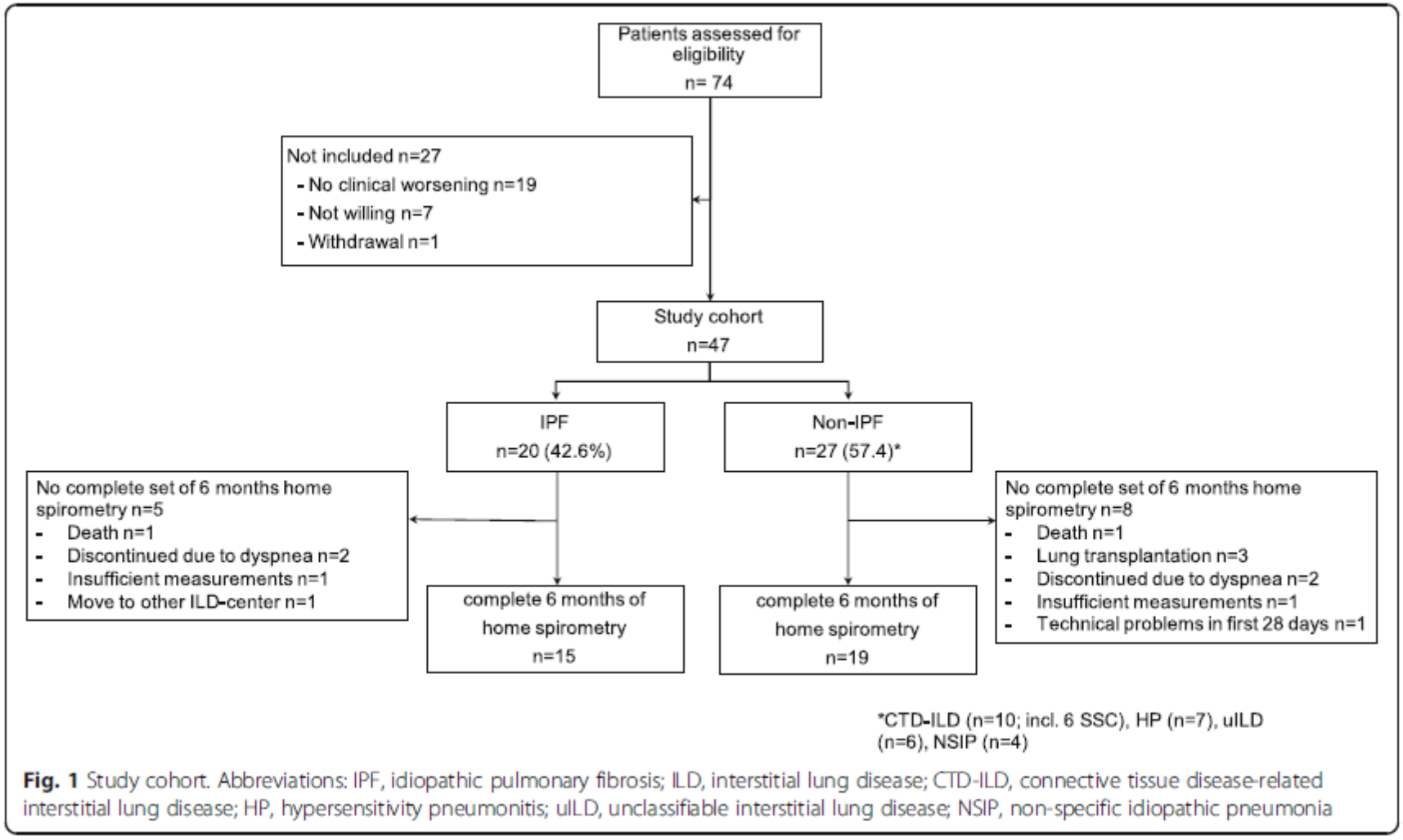


Fig. 1 Study cohort. Abbreviations: IPF, idiopathic pulmonary fibrosis; ILD, interstitial lung disease; CTD-ILD, connective tissue disease-related interstitial lung disease; HP, hypersensitivity pneumonitis; uILD, unclassifiable interstitial lung disease; NSIP, non-specific idiopathic pneumonia

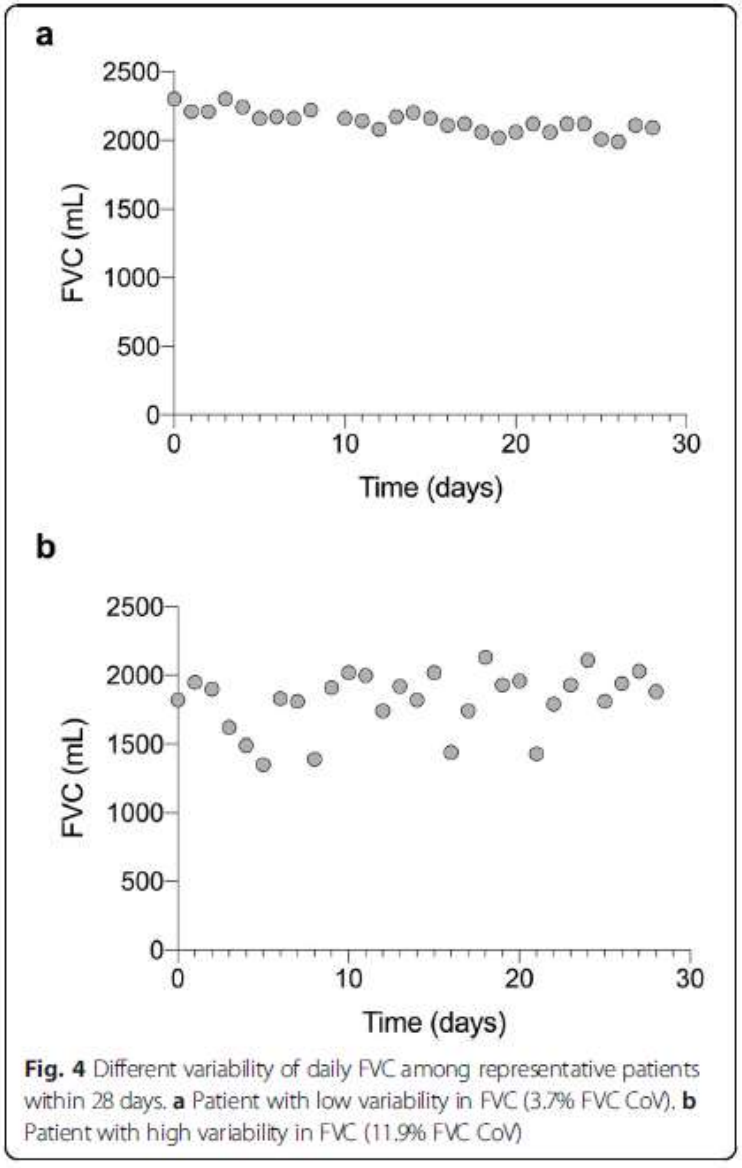


Fig. 4 Different variability of daily FVC among representative patients within 28 days. **a** Patient with low variability in FVC (3.7% FVC CoV). **b** Patient with high variability in FVC (11.9% FVC CoV)

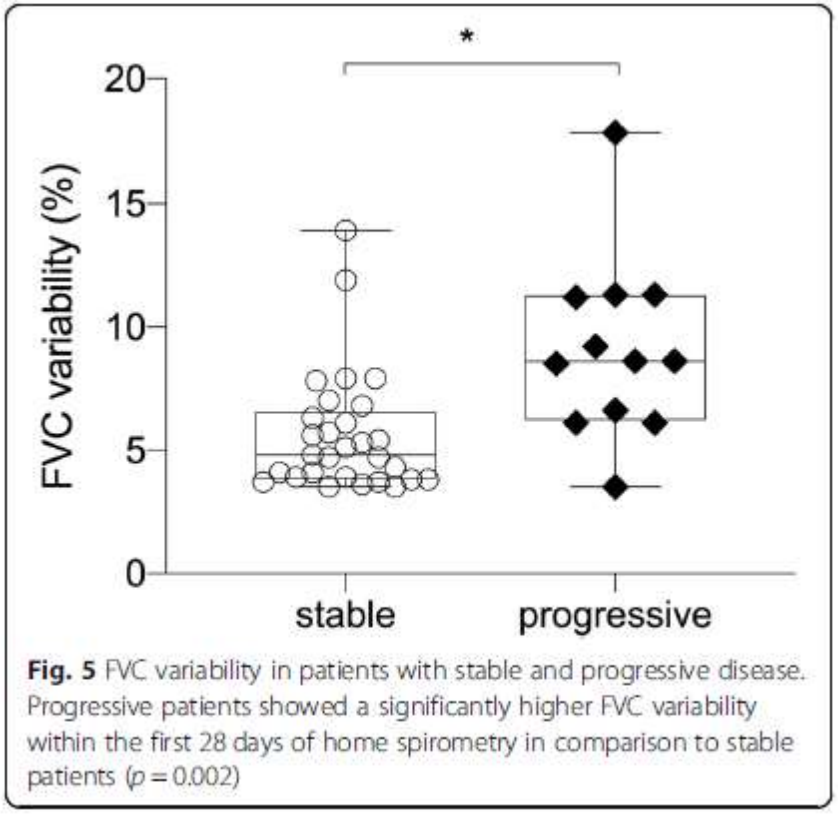


Fig. 5 FVC variability in patients with stable and progressive disease. Progressive patients showed a significantly higher FVC variability within the first 28 days of home spirometry in comparison to stable patients ($p = 0.002$)

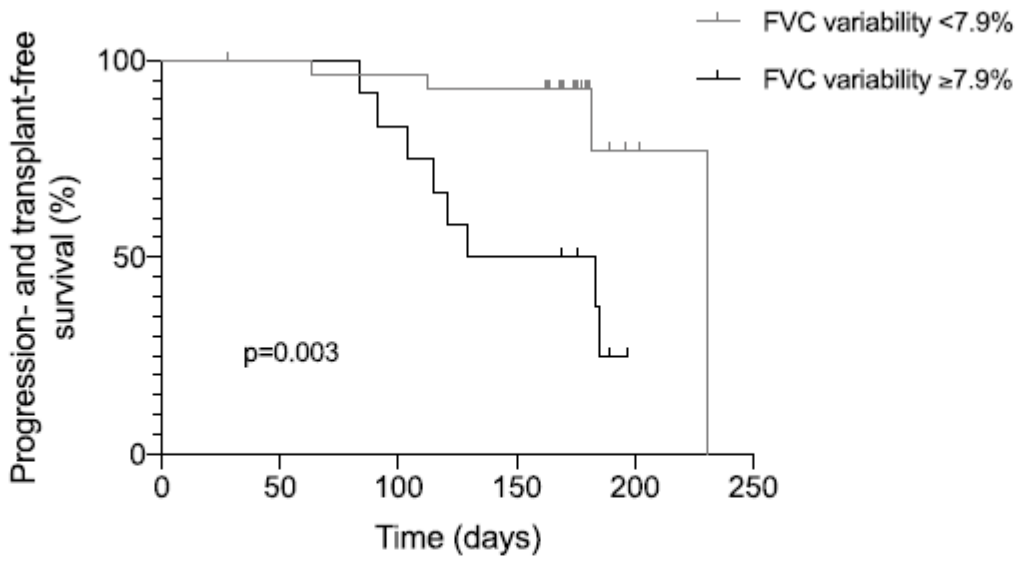


Fig. 6 Progression- and transplant-free survival in patients with low and high FVC variability. Based on the optimal cut-off of 7.9%, patients with high FVC variability (≥7.9%) had significantly shorter progression- and transplant-free survival compared to patients with low FVC variability (< 7.9%; $p = 0.003$)

Corrélation entre les mesures hospitalière et du domicile :

- 7 premiers jours sont comparés avec la CVF faite à l'hôpital au début de l'étude : bonne corrélation dans les 2 études

Observance :

- Arrêt car la mesure occasionne des quintes de toux
- Adhérence est de 90% le premier mois et chute à 81% à 6 mois dans la 2ème étude et à la fin de l'étude 45% ont une adhérence >90%
- Psychologiquement difficile de voir l'évolution (détresse psychologique)
- Pour une utilisation dans des études, suggestion de cacher au patient ses valeurs

Mesures à domicile est une opportunité pour détecter précocément les patients à mauvais pronostic

Veit *et al. Respiratory Research* (2020) 21:270

Home Monitoring of Patients with Cystic Fibrosis to Identify and Treat Acute Pulmonary Exacerbations

eICE Study Results

Noah Lechtzin[1], Nicole Mayer-Hamblett[2,3], Natalie E. West[1], Sarah Allgood[1], Ellen Wilhelm[2], Umer Khan[3], Moira L. Aitken[2], Bonnie W. Ramsey[2,3], Michael P. Boyle[1,4], Peter J. Mogayzel, Jr.[1], Ronald L. Gibson[2,3], David Orenstein[5], Carlos Milla[6], John P. Clancy[7], Veena Antony[8], and Christopher H. Goss[2,3]; for the eICE Study Team*

[1]Johns Hopkins University School of Medicine, Baltimore, Maryland; [2]University of Washington School of Medicine, Seattle, Washington; [3]Cystic Fibrosis Foundation Therapeutic Development Network, Seattle Children's Hospital, Seattle, Washington; [4]Cystic Fibrosis Foundation, Bethesda, Maryland; [5]University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania; [6]Stanford University School of Medicine, Palo Alto, California; [7]University of Cincinnati, Cincinnati, Ohio; and [8]Univeristy of Alabama at Birmingham, Birmingham, Alabama

Abstract

Rationale: Individuals with cystic fibrosis (CF) experience frequent acute pulmonary exacerbations, which lead to decreased lung function and reduced quality of life.

Objectives: The goal of this study was to determine if an intervention directed toward early detection of pulmonary exacerbations using home spirometry and symptom monitoring would result in slower decline in lung function than in control subjects.

Methods: We conducted a multicenter, randomized trial at 14 CF centers with subjects at least 14 years old. The early intervention arm subjects measured home spirometry and symptoms electronically twice per week. Sites were notified if a participant met criteria for an exacerbation and contacted participants to determine if treatment for acute exacerbation was required. Participants in the usual care arm were seen every 3 months and were asked to contact the site if they were concerned about worsening pulmonary symptoms.

Measurements and Main Results: The primary outcome was the 52-week change in FEV_1. Secondary outcomes included time to first exacerbation and subsequent exacerbation, quality of life, and change in weight. A total of 267 patients were randomized, and the study arms were well matched at baseline. There was no significant difference between study arms in 52-week mean change in FEV_1 slope (mean slope difference, 0.00 L, 95% confidence interval, −0.07 to 0.07; $P = 0.99$). The early intervention arm subjects detected exacerbations more frequently than usual care arm subjects (time to first exacerbation hazard ratio, 1.45; 95% confidence interval, 1.09 to 1.93; $P = 0.01$). Adverse events were not significantly different between treatment arms.

Conclusions: An intervention of home monitoring among patients with CF was able to detect more exacerbations than usual care, but this did not result in slower decline in lung function.

Clinical trial registered with www.clinicaltrials.gov (NCT01104402).

Keywords: cystic fibrosis; pulmonary exacerbation; clinical trial; home monitoring

(Received in original form October 30, 2016; accepted in final form June 13, 2017)

American Journal of Respiratory and Critical Care Medicine Volume 196 Number 9 | November 1 2017

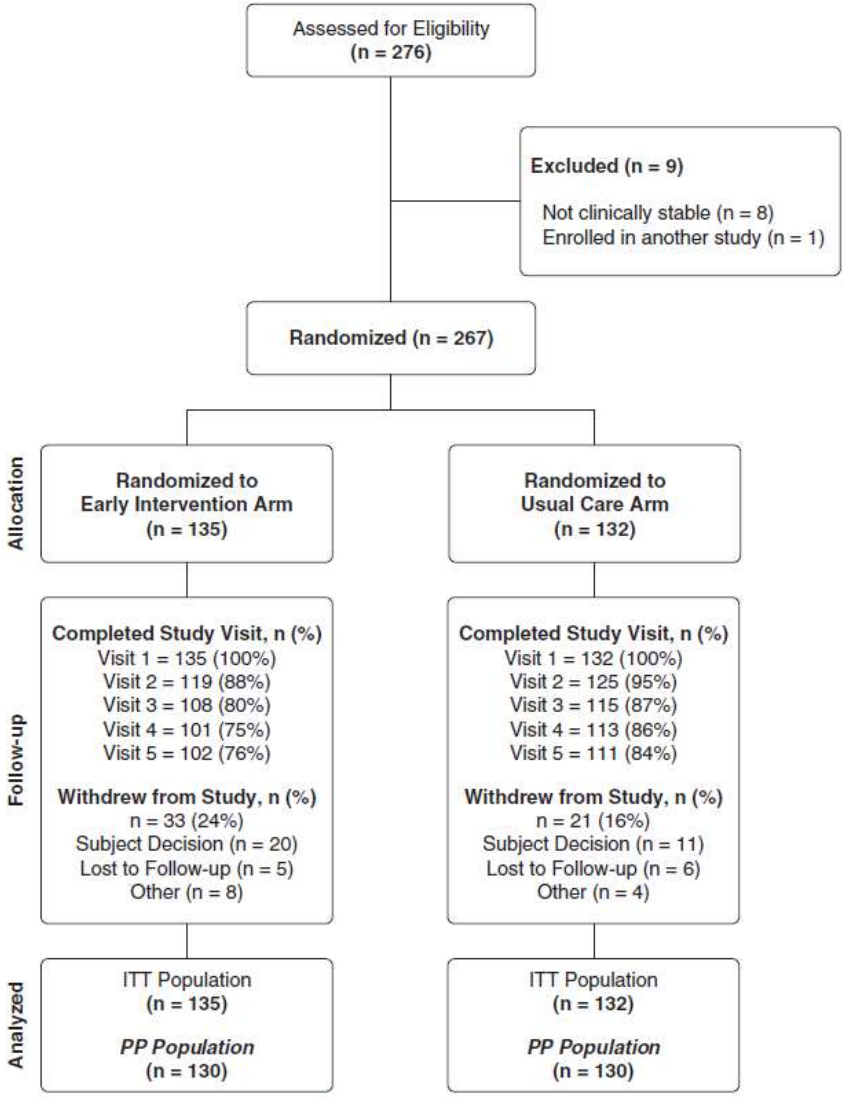


Figure 1. Consolidated Standards of Reporting Trials diagram showing participant flow in the eICE (Early Intervention in Cystic Fibrosis Exacerbation) study. ITT = intention-to-treat; PP = per protocol.

- 52 semaines
- 2 mesures/semaine
- Alerte si :
VEMS chute >10% ou
CFRSD avec aggravation
de 2/8 symptômes

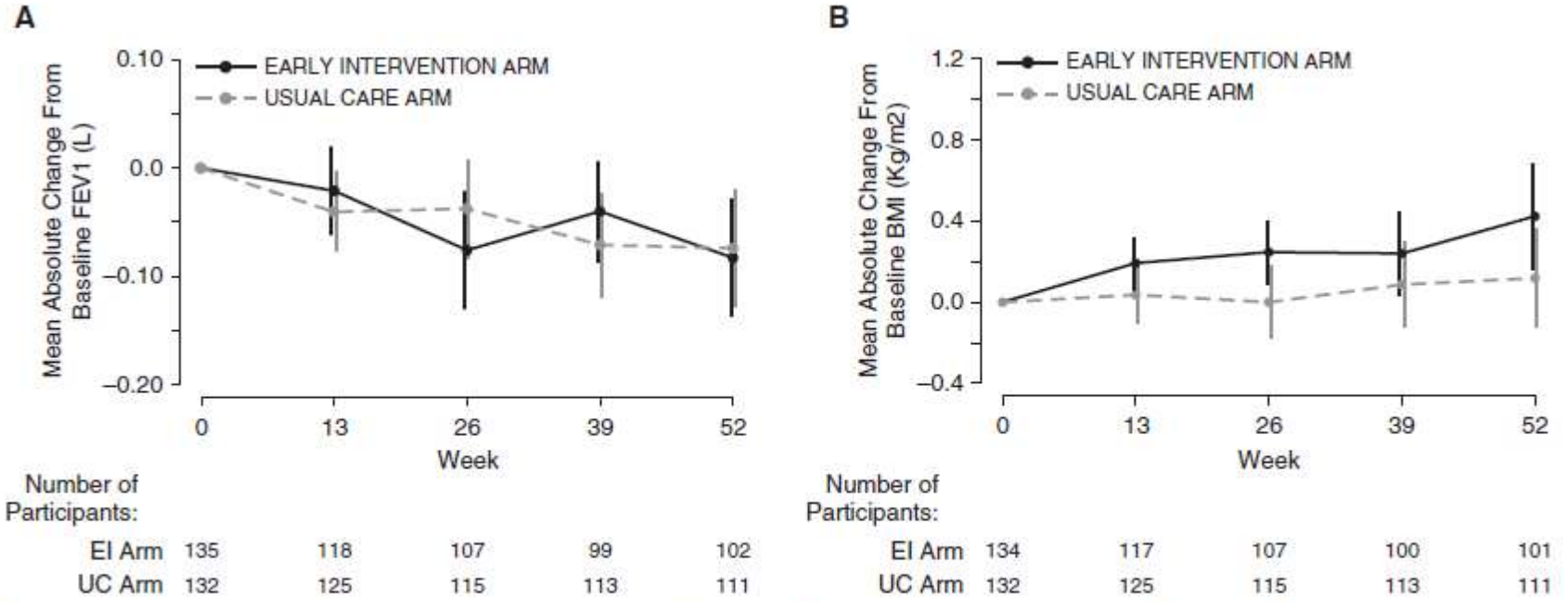


Figure 2. (*A*) Mean absolute change from baseline in FEV_1. (*B*) Mean absolute change from baseline in body mass index. Data are presented as means and 95% confidence intervals. BMI = body mass index; EI = early intervention; UC = usual care.

- Observance pour 1 transmission/semaine : 50%
- Observance pour 2 transmissions/semaine : 19%
- 524 alarmes pour 97 patients (72%)
- Pas de différence sur l' évolution du VEMS selon l'observance

l'institut du thorax

Table 3. Summary of Acute Visits

	EI Arm (*n* = 135)	UC Arm (*n* = 132)	*P* Value*	Total (*n* = 267)
Participants with at least one acute visit, n (%)	77 (57%)	38 (29%)	<0.001	115 (43%)
Distribution of acute visits per subject, n (%)				
0	58 (43%)	94 (71%)	<0.001	152 (57%)
1	37 (27%)	20 (15%)		57 (21%)
2–3	30 (22%)	17 (13%)		47 (18%)
⩾4	10 (7%)	1 (1%)		11 (4%)
Total number of acute visits	153	64	0.818	217
Acute visits missing PE evaluation†, n (%)	16 (10%)	8 (12%)	0.642	24 (11%)
Acute visits not meeting protocol-defined PE†, n (%)	29 (19%)	12 (19%)	1.000	33 (19%)
Requiring oral antibiotics‡	12 (41%)	4 (33%)	0.734	16 (48%)
Requiring intravenous antibiotics	4 (14%)	4 (33%)	0.202	8 (24%)
Requiring inhaled antibiotics	4 (14%)	2 (17%)	1.000	6 (18%)
Requiring any antibiotics	14 (48%)	8 (67%)	0.325	22 (67%)
Requiring hospitalization	5 (17)	4 (33%)	0.408	9 (27%)
Acute visits meeting protocol-defined PE†, n (%)	108 (71%)	44 (69%)	0.871	152 (70%)
Requiring oral antibiotics‡	72 (67%)	19 (43%)	0.010	97 (64%)
Requiring intravenous antibiotics	35 (32%)	23 (52%)	0.027	58 (38%)
Requiring inhaled antibiotics	16 (15%)	10 (23%)	0.244	26 (17%)
Requiring any antibiotics	91 (84%)	39 (89%)	0.615	130 (86%)
Requiring hospitalization	31 (29%)	22 (50%)	0.015	53 (35%)

Definition of abbreviations: EI = early intervention; PE = pulmonary exacerbation; UC = usual care.
*All *P* values are based on Fisher's exact test.
†The denominator for percentages is based on the total number of acute visits in each study arm.
‡The denominator for percentages is based on the number of acute visits meeting/not meeting protocol-defined PE.

- Détecter tôt les exacerbations ne suffit pas
- Plus de cures PO
- Moins de retour à la valeur initiale à 2 semaines d'antibiotiques
- Sous traitement de ces exacerbations précoces ?

UNIVERSITÉ DE NANTES

Received: 10 August 2017 | Accepted: 21 December 2017
DOI: 10.1002/ppul.23950

ORIGINAL ARTICLE: CYSTIC FIBROSIS

WILEY

Impact of home spirometry on medication adherence among adolescents with cystic fibrosis

Aarti Shakkottai MD[1] | Niko Kaciroti PhD[1] | Lauren Kasmikha[1] | Samya Z. Nasr MD, CPI[1]

Pediatric Pulmonology. 2018;53:431–436.

39 patients de12-21 ans
12 mois
Appel hebdomadaire pour voir si problème technique
Observance sur le réassort des traitements
CFQ-R

TABLE 1 Baseline demographics of the study participants

Characteristics	Intervention group (*N* = 39) mean (SD)
Age (years)	15.89 (2.18)
% female	54.00
Forced expiratory volume in 1 s (% predicted)	87.51 (19.80)
Body mass index (percentile)	55.23 (25.02)
No. of pulmonary exacerbations (12 months prior)	1.90 (1.65)

TABLE 2 Medication possession ratio (MPR) by medication type in the year prior to enrollment and during the study

Medication name	Pre-study MPR	Study MPR	*P*-value
CF vitamins	56%	61%	0.245
Dornase alfa	66%	71%	0.188
Pancreatic enzymes	55%	59%	0.247
Inhaled hypertonic saline	66%	72%	0.125
Across all medications	60%	65%	0.038

Adhérence 59,4% et 30% l'ont utilisé comme demandé pendant 80% du temps de l'étude.
Pas de différence sur le nombre de cures par rapport à l'année précédente
Pas de modification du déclin du VEMS

Pediatric Pulmonology. 2018;53:431–436

Original paper

Chronic Respiratory Disease

Daily spirometry in an acute exacerbation of adult cystic fibrosis patients

Chronic Respiratory Disease
2018, Vol. 15(3) 258–264

DOI: 10.1177/1479972317743756
journals.sagepub.com/home/crd
SAGE

Michael J Stephen[1], Alex Long[2], Chad Bonsall[3], Jeffrey B Hoag[1], Smita Shah[4], Dorothy Bisberg[4], Douglas Holsclaw[3], Laurie Varlotta[5], Stan Fiel[6], Doantrang Du[7], Robert Zanni[7] and Denis Hadjiliadis[3]

Abstract

To help answer the question of length of intravenous antibiotics during an acute exacerbation of cystic fibrosis (CF), we had subjects to follow daily home spirometry while on intravenous antibiotics. CF patients, 18 and older, with an acute exacerbation requiring intravenous antibiotics had a daily FEV1. The average time to a 10% increase over their initial sick FEV1 was calculated, as well as the time to a new baseline. A total of 25 subjects completed the study. Ten of the 25 subjects did not have a sustainable 10% increase in FEV1. Of the 15 subjects with a sustainable 10% increase in FEV1, it took 5.2 days ($\pm$4.5) after day 1, while a new baseline was achieved on average at 6.6 days ($\pm$4.8) after day 1. Given the wide range of time to a 10% improvement and new baseline, it is recommended there should be flexibility in length of intravenous antibiotics in CF, not by a preset number.

Conclusion

- Grosse difficulté est l'observance qui s'émousse avec le temps
- S'intègre dans un programme d'éducation thérapeutique

Transplantation pulmonaire :

- Permet de détecter les BOS plus précocément
- Les patients observants font moins de BOS

BPCO :

- Evite des passages aux urgences

Fibrose :

- Permet de donner à 3 mois une évolution pronostique

Mucoviscidose :

- Permet de détecter précocement les exacerbations
- Effet sur le VEMS reste encore à démontrer

eHealth in CF : Promising, but proof of concept is still needed

Je vous remercie de votre attention

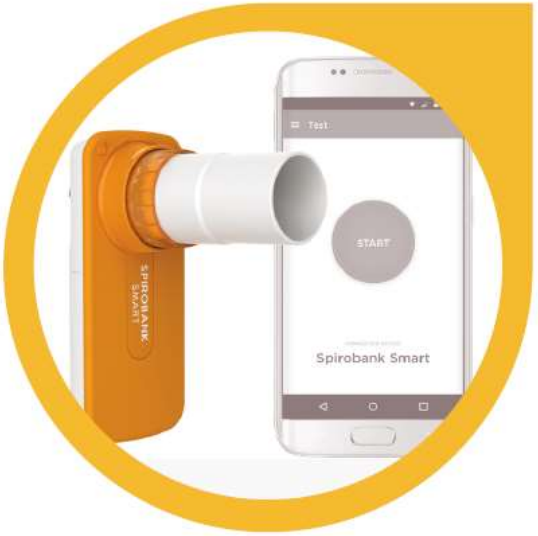
Guide d'utilisation du Spirobank Smart

CRCM adultes de Nantes - Juin 2020

CENTRE HOSPITALIER UNIVERSITAIRE DE NANTES

l'institut du thorax

Guide d'utilisation du Spirobank Smart



CRCM adultes de Nantes - Juin 2020

CENTRE HOSPITALIER
UNIVERSITAIRE DE NANTES

Quand souffler ?

Les 15 premiers jours

3 fois par semaine à raison de 2 mesures à chaque fois, au même moment dans la journée.

Nous vous demanderons de nous envoyer toutes ces mesures par mail à la fin de cette période de 15 jours (via l'application).
Ces mesures vont nous permettre de déterminer une valeur de référence qui vous sera propre et à laquelle vous vous référerez pour surveiller vos mesures, nous vous indiquerons aussi les valeurs à -5% et à -10% qui doivent vous alerter.
Nous vous enverrons ces valeurs par mail.

Après cette période de 15 jours

Nous vous demanderons de souffler :

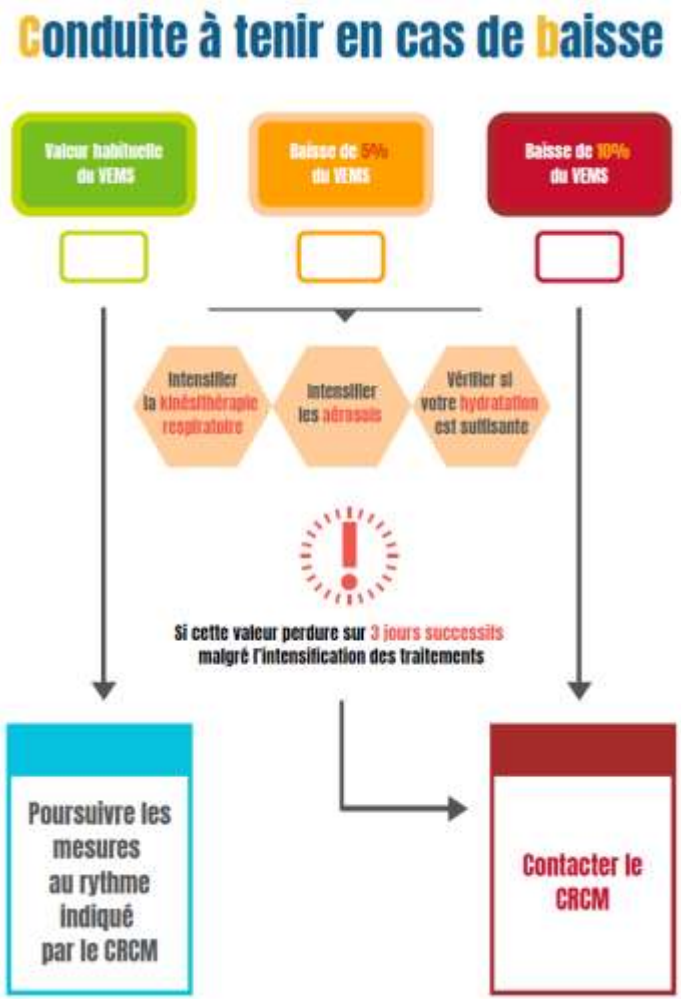
- 2 jours avant et la veille d'une téléconsultation avec le CRCM
- 15 jours après la fin d'une cure d'antibiotiques
- Si essoufflement plus important
- Si encombrement plus important
- Ou autre symptôme évocateur d'une exacerbation
- A la demande du CRCM

Comment nous envoyer vos données ?

Quand vous êtes sur l'écran de vos résultats, appuyer sur la flèche en haut à droite puis "envoyer par mail" à l'adresse :

bp-kinescrcm-adulte@chu-nantes.fr

UNIVERSITÉ DE NANTES



Bilan à 6 mois :

122 patients appareillés sur 162
7 refus
40 non équipés
décision médicale, pas de prestataire
92 éduqués en présentiel et 23 non
54 patients ont leur valeur de référence
44% des équipés et 58% de ceux éduqués

Je vous remercie de votre attention

Merci à nos infirmières coordinatrices :
Sophie Cormerais
Véronique Loppinet
Sandrine Quemeneur
Céline Raybaud

Prestataires partenaires

Merci à nos kinésithérapeutes:
Laurence Barberis
Claire Dary
Elisabeth Herbert