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Do general practitioners follow treatment recommendations from guidelines in their decisions on heart failure management? A clinical vignette study

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Article Focus

- Most general practitioners often see patients with heart failure.
- We studied whether general practitioners follow recommendations from clinical practice guidelines in their management of such patients
- We used a clinical vignette patient with heart failure and a reduced ejection fraction
- We assessed which doctor characteristics related to their management decisions

Key Messages

- In their management of heart failure patients GPs hardly appear to follow recommendations from clinical practice guidelines.
- Giving priority to evidence-based medicine appears related to following recommendations from clinical practice guidelines.
- Stopping statin treatment when a patient feels comfortable, or increasing β-blocker dose when a patient experiences more complaints, may appear as counterintuitive recommendations.

Strengths and Limitations

In total 451 GPs participated in our clinical vignette study. Unfortunately, the statistical power of our analyses on the relation of doctor characteristics as determinants of their management decisions was strongly reduced by the very few GPs that followed recommendations from clinical practice guidelines.

ABSTRACT

Objective: To investigate whether general practitioners (GPs) follow treatment recommendations from clinical practice guidelines in their decisions on the management of heart failure patients, and assess whether doctors' characteristics are related to their decisions.

Design: Cross-sectional vignette study.

Setting: Continuing Medical Education meeting.

Participants: Dutch GPs.

Main outcome measures: Answers to four multiple choice treatment decisions in clinical vignettes of a patient with heart failure and a reduced ejection fraction. With univariable and multivariable regression analyses, respondent characteristics were related to optimal treatment decisions.

Results: Of the 451 GPs, none took four optimal decisions: 7% considered stopping statin treatment, 36% initiated β-blocker treatment at a low-dose and 4% doubled the β-blocker in the up-titration phase. Finally, for our vignette patient now also suffering from chronic obstructive pulmonary disease, 45% of the GPs continued β-blocker therapy even when they considered prescribing a long-acting β2-agonist. While the relation between respondent characteristics and each decision was very different, none was independently associated with all four decisions. Giving priority to evidence-based medicine was independently related to stopping statin treatment and doubling the β-blocker in the up-titration phase.

Conclusions: GPs seem not to follow treatment recommendations from clinical practice guidelines in their decisions on the management of heart failure patients. The recommendations from guidelines may appear counterintuitive when statin treatment needs to be stopped when a patient feels comfortable, or when a β-blocker should be up-titrated in patients who experience more complaints. Giving priority to evidence-based medicine is possibly positive related to difficult treatment decisions.

INTRODUCTION

Robust evidence is available about optimal management of patients with heart failure and a reduced ejection fraction (HF-REF).(1) This evidence is included in clinical practice guidelines (CPGs), which aim is to serve as up-to-date evidence summaries, to provide recommendations on medical decisions, to prevent unwarranted inter-doctor variation, and to promote best practice. However, counterintuitive recommendations, i.e. those in conflict with prior knowledge or common clinical practice, or those which are unclear or ambiguous seem most sensitive to poor agreement, acceptance and adherence.

Based on evaluation and reviews of patient records and insurance claims previous studies showed that adherence to guidelines on heart failure (HF) differs largely between physicians.(2-5) A systematic review reported that adherence to CPGs was increased among female practitioners, those of younger age, with a belief in EBM, and with feedback by peers.(6) Yet, research has failed to show a consistent relation between doctor characteristics and quality of care (3;7;8), while female sex was reported to be related to better physician's performance (8), and being part of a group practice was reported to improve optimal drug prescription in patients with cardiovascular disease.(3;7)

For any patient with cardiovascular disease, stopping statins is generally considered useful. A fairly recent insight is that statins have only a neutral effect in patients with HF-REF.(9;10) Although recent guidelines on HF incorporate this evidence, they fail to provide a clear recommendation on stopping statins. While they mention the 'unproven benefit' of statins, they on the one hand advocate not to initiate statins, but on the other hand do advise neither to stop statins in patients with HF-REF, nor to consider potential interactions with polypharmacy.(1) Moreover, the willingness of a physician to stop this drug when a patient

does not experience any adverse effects will probably be low. Therefore, a recommendation to stop statins in patients with HF-REF may appear counterintuitive.

While β-blockers were considered contra-indicated some decades ago, they are now viewed as mandatory in HF-REF. The large body of evidence on the effectiveness of β-blockers in HF-REF has been incorporated in HF guidelines since 2001. Nevertheless up-titration of β-blockers has not been adopted, in particular by general practitioners (GPs).(2;3) Moreover, qualitative studies showed that GPs tend to refrain from initiation and up-titration of β-blockers because of fear for adverse effects and interactions with comorbid conditions.(11;12) During β-blockers up-titration an initial reduction in exercise tolerance can be expected, and this certainly may have had an impact on the slow adoption of β-blocker treatment by physicians.(13) It is therefore that the currently available guidelines may appear counterintuitive when they recommend up-titration of β-blockers irrespective of both symptom severity and patient's water or salt retention.(2-5)

A more recent shift in management is that cardioselective β-blockers are no longer considered contra-indicated in chronic obstructive pulmonary disease (COPD) (14;15) as they were a decade ago. Since 2008, HF guidelines recommend not to withhold cardioselective β-blockers when indicated.(16) Since 2011, guidelines on COPD follow this recommendation.(17) Still, both guidelines do not provide clear recommendations on combining β-blockers with β2-agonists in patients with HF and concomitant COPD.

Clinical vignette surveys showed to be especially effective and efficient for the evaluation of inter-doctor variation in treatment decisions.(18;19) We therefore used a clinical vignette mimicking four common treatment decisions for an imaginary patient with HF-REF.

We thereby concentrated on CPG recommendations on the management of patients with HF regarding prescribing statins and β-blockers which for different reasons can be considered as

counterintuitive, i.e., in conflict with common practice or prior knowledge, or can be considered as unclear. We also assessed whether GP characteristics were related to optimal treatment decisions.

METHODS

Setting and participants

We collected data during a two-day CME meeting for GPs in December 2010 in which a wide range of clinical topics were addressed, attracting GPs nationwide (Boerhaave meeting, Leiden, the Netherlands). We used an electronic voting system that prevented respondents from going back and forth between questions, and allowed a maximum of 60 seconds to respond. Participating GPs were instructed to make decisions that reflect their actual practice. To prevent carry-over effects, i.e., making interdependent inappropriate decisions, the best treatment decision was provided after each question but before the next information block and question. Data was collected anonymously.

Vignettes

We presented four information blocks on consecutive encounters with an imaginary patient with HF-REF (see Text Box). Each information block included details on signs, symptoms, additional investigations and diagnosis to arrive at the treatment decision in accordance with the CPG recommendations. At the end of each information-block we asked a multiple choice question with four or five decision options for the treatment decision. We asked respondents to indicate their level of confidence on the chosen treatment decision.

In accordance with the evidence-based CPG treatment recommendations the decision for the first patient encounter was to stop statins (9;10), irrespective of the fact that the patient did not experience any adverse effects. For the second patient encounter, this was adding a low-dose

β-blocker to ACE- inhibitors and diuretics in a clinically stable patient.(16;20) At the third encounter, doubling the β-blocker dosage was in accordance with the evidence-based CPG treatment recommendations, and not contraindicated because of the relapse in exercise tolerance.(16;20) At the fourth encounter for a patient with HF-REF and COPD, not withholding a cardioselective β-blocker irrespective of prescribing a long-acting inhalation β2-agonist was the decision in accordance with the evidence-based CPG treatment recommendations.(15;16;20)

Characteristics of respondent

Based on a review of the literature we considered age, sex, years in practice, practice size, current professional tasks and responsibilities, experience with doing research, decision making style, first acquaintance with EBM, priority given to EBM, sources consulted for keeping up-to-date with evidence, and perceived EBM performance of themselves and colleagues, as relevant putative determinants for quality of patient care and adherence to evidence-based CPGs. (3;6-8;21) We asked information from participating GPs about this, together with their confidence and preferred information sources for arriving at each treatment decision.

Vignette pre-testing

Sixty-eight GPs participated in pre-test sessions in which they judged that the questions and the imaginary patient scenario were sufficiently genuine and representative of actual clinical practice. We also ensured that the wording was unambiguous. In addition, they did not encounter hidden prompts towards socially desirable answers nor cues to the evidence-based CPG treatment recommendations. Based on the pre-test sessions we finalized the vignette.

Data analyses

The respondent characteristics on priority given to EBM, own EBM performance, colleagues' EBM performance, and confidence on each treatment decision – all with a 9-point response scale – were dichotomised: 1 to 6 for low/poor and moderate/modest, and 7 to 9 for high/excellent. The scores for decision-making style – with a 9-point response scale – was dichotomised: 1 to 6 intuitive or mixed intuitive and rational, and 7 to 9 in rational.

We summed the four treatment decision confidence scores and dichotomised them in low to moderate (1 to 24), and high (25 to 36) overall confidence. We dichotomized the treatment decisions into those in accordance with CPG treatment recommendations or not. Before applying multivariate analysis, we assumed missing decisions to reflect 'wrong' decisions, and used unconditional median imputation for missing respondent characteristics. With multivariate logistic regression analyses we explored which GP characteristics were related to each of the decisions in accordance with CPG treatment recommendations. We included GP characteristics which had a univariate relationship with at least one treatment decision in accordance with CPG treatment recommendations (p-value ≤ 0.20). For the final multivariate model per treatment decision, we retained respondent characteristics with a p-value ≤ 0.10. We used SPSS, version 20.0 for Windows (SPSS Inc., Chicago, IL, USA) for all data analyses.

RESULTS

We obtained data from 451 respondents, i.e., 72% of the 623 GPs who signed the attendance list of the CME meeting. There were 10% missing data for decision point 1 and 4, 2% missing data for decision point 2, 5% for decision point 3. Seven respondent characteristics had fewer than 4% missings, and five characteristics had 4% or more missings, with a maximum of 10% for sex. The respondents resembled the Dutch GP population; most were male, about half were older than 50 years of age, and women were over-represented in the younger age categories. Most respondents had been in practice for more than 10 years, practiced alone or with one other GP, did not train GP registrars, and had no research experience (Table 1). Respondents preferred reading journals (30%), following CME (28%), and consulting Dutch GP guidelines (27%) for keeping up-to-date with evidence. About 40% of respondents gave EBM high priority, and rated their own EBM performance as excellent (Table 1).

Treatment decisions

The number of optimal treatment decisions was low for all four decisions (Table 2). While 195 GPs (43%) had high confidence about their first decision, 32 (7%) respondents considered to stop statin treatment. For the second decision, 171 GPs (38%) were highly confident, while 163 GPs (36%) decided to initiate a β-blocker at an appropriate low-dose. While 124 GPs (27%) were highly confident in their third decision, 17 (4%) decided to increase β-blocker dose to target for maximum tolerated dose irrespective of the fact that the patient had a relapse in exercise tolerance. For the fourth decision, 79 GPs (18%) were highly confident with their decision, while 202 (45%) decided to continue β-blockers even when a long-acting inhalation β2-agonist was considered necessary for the patient with HF-REF and COPD. Another 32% of GPs decided that β-blockers could not be combined with β2-agonists and therefore continued β-blockers with an inhalation anticholinergic.

None of the participants responded optimal to all four decision points, 9 (2%) GPs decided optimally for three decision points, 86 (19%) twice, and 215 (48%) once. Finally, 141 GPs (31%) never decided optimally.

Impact of respondent characteristics on treatment decisions

The distribution of appropriate treatment decisions for GP characteristics is shown in Table 3. Univariate analysis (data not shown) revealed that *age*, *sex* (male), *number of years in practice* (more than 20 years), *research experience* (none), *first acquaintance with EBM* (after medical school or residency), *EBM performance of GP colleagues* (low or moderate), *giving priority to EBM* (high), and *overall confidence* across four treatment decisions (high) were all related to both the decision to stop statin treatment and the decision to double β-blocker dosage.

Table 4 shows the results of the multivariate analysis for GP characteristics with an univariate relationship with at least one decision in accordance with CPG treatment recommendations. These multivariate analyses showed that *age* was independently associated with three decisions; *number of years in practice, first acquaintance with EBM*, *priority given to EBM*, and *EBM performance of GP colleagues* were each associated with two decisions. Only high *priority given to EBM* show a significant independent association with two decisions in a consistent direction: stopping statin treatment and doubling β-blocker dosage. The other doctor characteristics assessed during multivariate analysis were related to one treatment decision (Table 4). During neither univariate nor multivariate analysis, any of the doctor characteristics was related to accordance with CPG recommendations on all four treatment decisions.

DISCUSSION

Most treatment decisions by GPs on prescribing statins and β-blockers in a clinical vignette patient with HF-REF were not in accordance with recommendations from available CPGs, in particular those which may appear counterintuitive, i.e., conflicting with common practice or prior knowledge . None of the relevant doctor characteristics was related to accordance with CPG recommendations on all four treatment decisions. But encouragingly, giving high priority to EBM in clinical practice was associated with the decision to stop statins while the patient does not mention any adverse effect, and with the decision to up-titrate β-blockers while the patient experienced a commonly associated and therefore predictable relapse in exercise tolerance.

Some aspects of our findings deserve further consideration. First, our study setting (Boerhaave) may have been somewhat artificial and this may have contributed to the low number of GPs taking decisions in accordance with the CPG recommendations. Still, our approach to data collection, notably clinical vignette surveys with self-reported responses, has been shown to be effective and efficient in evaluating variation in treatment decisions.(18;19) Moreover, our use of multiple-choice response options, rather than an open-ended format, may have resulted in either or both an underestimation of actual practice variation (19) and overestimation of doctor performance.(22)

Second, numerous participating GPs may have been reluctant to stop statins when a patient feels comfortable with them (decision 1), while many were hesitant to initiate β-blocker treatment (decision 2) or to up-titrate the β-blocker to the recommended dose, even if the complaints of patients turn out to be no contra-indication for this (decision 3). Furthermore, many turned out to be rather cautious to combine β-blockers with a long-acting inhalation β2-agonist in the management of patients with HF-REF and COPD (decision 4).

Third, our vignettes concern CPG recommendations on the management of HF-REF patients which, to some extent and for different reasons may appear counterintuitive or can be considered ambiguous or unclear. Therefore, one might question whether and when it is appropriate for a GP to follow CPG recommendations in the management of HF-REF patients. While CPGs clearly recommend not to initiate statins for patients with HF-REF, they do not advise to stop.(1) We think, however, that continuing a drug that is not beneficial is a waste of money, and especially in patients with HF-REF the risk of polypharmacy and interactions is high. The evidence on the effectiveness of β-blockers for HF-REF is available for more than a decade, (23-29) and their careful up-titration is advocated in the available guidelines on HF.(16;20) Still, previous qualitative studies showed that GPs were unfamiliar with their beneficial effects and poorly adhered to the latest guidelines with respect to β-blockers.(11;12) While β-blocker intolerance in HF-REF is very low (5;11;12), GP are hesitant to prescribe β-blockers because of individual prior negative experiences and their concerns about harmful effects.(11) While CPGs discuss continuation of β-blockers, preferably cardioselective ones in patients with HF-REF and COPD, they provide no clear recommendation about combining β-blockers with β2-agonists.(16;20) Combining β-blockers and β2-agonists may seem counterintuitive, but adverse effects are very rare. (14;15) Certainly, GPs may have been confused by contradictory recommendations from current (i.e., up to 2011) guidelines in cardiology advocating not to refrain from β-blockers in patients with COPD, and guidelines in pulmonology discussing β-blockers as (relatively) contraindicated in patients with COPD. It should be noted that after data for this study had been collected, the pulmonology guidelines that have been issued in 2011 recommend β-blockers in HF patients with COPD.(17)

Finally, although our findings on the poor adherence to CPG recommendations may have important implications for patient care, they may have been subject to chance. Moreover, despite our large sample size, the low number of decisions in accordance with CPG recommendations decreased statistical power to identify characteristics related to adherence to CPG recommendation. Still, the associations between doctor characteristics and adherence to CPG recommendations that have been reported to date were weak and lacked consistency across studies.(3;7;8)

While the CPG recommendations for the management of patients with HF-REF are unclear or ambiguous, or may appear counterintuitive, we conclude that GPs appear not to follow evidence-based CPG recommendations in their decisions on prescribing statins and β-blockers for patients with HF-REF. None of the relevant respondent characteristics was consistently associated with decisions in accordance with CPG recommendations. Encouragingly, giving high priority to EBM in clinical practice was related to adherence to the guidelines for more decisions.

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Ethics approval The study was performed in accordance with the principles outlined in the Declaration of Helsinki, and the Medical Ethics Committee of the University Medical Centre Utrecht, The Netherlands provided a waiver for informed consent of participants.

Contributorship statement

Conception and design of study

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Conception and design of patient vignette

Frans H Rutten, Maartje HJ Swennen, Alfred PE Sachs, Geert JMG van der Heijden.

Collection and assembly of data

Alfred PE Sachs, Maartje HJ Swennen, Geert JMG van der Heijden.

Statistical expertise

Yolanda van der Graaf, Geert JMG van der Heijden.

Analysis and interpretation of the data

Maartje HJ Swennen, Yolanda van der Graaf, Geert JMG van der Heijden.

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Conflict of interest statement

The authors have declared that no competing interests exist.

Data sharing statement

There is no additional data available.

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Table 1. Baseline characteristics of the 451 responding GPs

Doctor characteristics		N (%)
Sex [a]	Male	266 (62)
	Female	162 (38)
Age (yrs) [b]	21-50	189 (47)
	51 +	217 (53)
Years in practice [a]	0 – 20	218 (50)
	21 +	219 (50)
Practice size [a]	Solo practice	104 (24)
	Duo or group practice	334 (76)
Current job [b]	GP only	306 (72)
	GP plus other †	120 (28)
Research experience [a]	No	341 (78)
	Yes	99 (22)
First acquaintance with EBM [a]	Medical school or residency	234 (53)
	After GP certification, while doing research	208 (47)
Priority given to EBM in own daily practice [a]	Low or moderate	239 (55)
	High	193 (45)
Own EBM performance [a]	Poor or moderate	253 (58)
	Excellent	186 (42)
EBM performance of GP colleagues [a]	Poor or moderate	272 (62)
	Excellent	164 (48)
Decision making style [a]	Strong intuition or mixed	305 (70)
	Strong ratio	128 (30)
Preferred source || for keeping up-to-date with evidence [a]	Oral reference	139 (32)
	Written reference	302 (68)

Legend to Table 1

Missing data. a: <5%; b: 5%<>10%

† Other = registrar supervision, research, education, management.

|| Oral reference, i.e., colleagues, specialists, pharmaceutical reps or CME. Written reference, i.e., internet, guidelines, handbooks or journals.

Table 2. Number (%) of respondents with CPG based treatment decisions

		Decision 1 Stop statin	Decision 2 Start low dose β-blocker	Decision 3 Double dose of β-blocker	Decision 4 Continue β-blocker in COPD
GPB based decision		**32 (7)**	**163 (36)**	**17 (4)**	**202 (45)**
Confidence per treatment decisions §	High	195 (43)	171 (38)	124 (27)	79 (18)
	Moderate or low	256 (57)	280 (62)	327 (73)	372 (82)
	Mean (sd)	*6 (2)*	*6 (2)*	*5 (2)*	*4 (2)*

† Number of respondents (n=451) with four CPG based decisions

§ Confidence per treatment decision: the 9 point ordinal scale ranging from 1 (lowest possible confidence in appropriateness of decision) to 9 (highest possible confidence in appropriateness of decision) was dichotomised to high (7 to 9), moderate or low (1 to 6).

Table 3. Proportion respondents with CPG based treatment decisions per doctor characteristic

			Decision 1 **Stop statin**	Decision 2 **Start low dose β-blocker**	Decision 3 **Double dose of β-blocker**	Decision 4 **Continue β-blocker in COPD**
Doctor characteristic	**Status**	**N**	**%**	**%**	**%**	**%**
Sex	Male	266	9	42	5	43
	Female	162	5	29	2	47
Age (yrs)	21-50	189	4	37	5	47
	51+70	217	11	36	3	44
Years in practice	0 – 20	218	5	37	2	43
	21 +	219	9	36	5	44
Practice size	Solo practice	104	20	98	11	118
	Duo or group practice	334	2	17	2	21
Current job	GP	306	8	49	5	56
	GP plus	120	4	8	0	13
Research experience	No	341	8	39	4	45
	Yes	99	5	27	2	44
First acquaintance to EBM	Med school / residency	234	12	65	6	79
	During research	208	1	4	0	3
Priority given to EBM	Low or moderate	239	5	38	3	47
	High	193	9	36	6	44
Own EBM performance	Poor or moderate	253	8	37	3	43
	Excellent	186	6	35	4	44
EBM performance of GP colleagues	Poor or moderate	272	8	40	5	44
	Excellent	164	5	30	2	45
Decision making style	Intuitive or mixed	305	8	36	3	43
	Rational	128	5	38	5	48
Confidence per treatment decision	Low or moderate	274	7	30	4	60
	High	114	11	71	5	30
Preferred source for keeping up-to-date	Oral reference ‖	139	10	34	3	44
	Written reference ‖	302	6	37	4	43

Legend to Table 3

§ Overall confidence across treatment decisions, i.e., sum of confidence scores of all four treatment decisions. In 14% of the participants there was one or more of the four confidence scores missing.

‖ Oral reference, i.e., colleagues, specialists, pharmaceutical reports or CME. Written reference, i.e., internet, guidelines, handbooks or journals.

Table 4.

Independent associations *(multivariate odds ratio and their 95% CI)* between doctor characteristics (n=451 GPs) and CPG based treatment decisions

		Decision 1 Stop statin	Decision 2 Start β-blocker at low dose	Decision 3 Double dose of β-blocker	Decision 4 Continue β-blocker in COPD
Sex	Male		-		
	Female		0.58 (0.37;0.92)		
Age (yr)	21-50	-		-	-
	51+	2.13 (0.90;5.01)		0.18 (0.04;0.72)	0.60 (0.37;0.98)
Years in practice	0-20			-	
	21+			6.15 (1.49;25.3)	
First acquaintance with EBM	Medical school/ residency		-		-
	Afterwards or during research		0.67 (0.43;1.04)		1.64 (1.01;2.66)
Priority given to EBM	Low or moderate	-		-	
	High	1.70 (0.77;3.74)		2.88 (0.94;8.90)	
EBM performance of GP colleagues	Poor or moderate		-	-	
	Excellent		0.57 (0.37;0.88)	0.36 (0.10;1.31)	
Confidence in treatment decision	Low or moderate		-		
	High		2.27 (1.49;3.46)		
Overall confidence across four treatment decisions	Low or moderate				-
	High				0.91 (0.60;1.36)
Preferred source for keeping up-to-date	Oral reference †	-			
	Written reference †	2.41 (1.10;5.31)			

Legend to Table 4

† Oral reference, i.e., colleagues, specialists, pharmaceutical reports, or CME. Written reference, i.e., internet, guidelines, handbooks or journals.

Text Box

Clinical vignette on an imaginary patient with heart failure and a reduced ejection fraction (HF-REF)

Information block 1

Mr. Peters, male, 72 years of age visits your GP surgery because he increasingly experiences shortness of breath during exercise. He has no chest pain.

Medical history: Hypertension since 1988, and an anterior wall myocardial infarction in 2001. Medication use: chlorthalidone 12.5 mg o.d.; enalapril 5 mg b.i.d.; acetylsalicylic acid 80 mg o.d.; simvastatin 40 mg o.d.

Physical examination: blood pressure 146/87 mmHg, pulse 92 bpm regular, a broadened and sustained apical impulse in left decubital position, and normal pulmonary breathing sounds.

Additional tests:

- plasma amino-terminal B-type Natriuretic Peptide (NT-proBNP) level 1010 pg/ml (completely normal when <125 pg/ml ≈ 15 pmol/l)
- ECG showing abnormal Q-waves suggestive for prior MI
- Echocardiography: a somewhat dilated heart with wall movement abnormalities compatible with a prior MI, and a left ventricular ejection fraction (LVEF) of 30%. No clinical relevant valvular disease.

Conclusion: Heart failure with a reduced ejection fraction caused by long-term HT and prior MI.

Question 1: What do you decide? Do you continue or stop prescribing simvastatin?

Response options

- Continue, because heart failure is a cardiovascular disease
- Continue, but only if the patient would have heart failure with preserved ejection fraction
- Continue, but only in patients with HF-REF and a history of ischemic heart disease
- Stop, because statins do not have added value in patients with HF-REF

Decision 1, CPG based response: Stop simvastatin

Information block 2

During the last consultation you decided to stop simvastatin, and additionally, you changed chlorthalidone to furosemide 40 mg o.d., and doubled the dosage of enalapril to 10 mg b.i.d.

Now, **4 weeks later** Mr. Peters consults you again. He feels much better now. His exercise tolerance has increased and he feels less tired during and after exercise: “I can walk a larger distance now.” On physical examination his blood pressure is 142/84 mmHg, and the pulse 84 bpm, regular. He has normal breathing sounds and there are no signs of peripheral oedema.

Question 2: Do you want to change the medical prescription of Mr Peters?

Options
- Yes, I want to add metoprolol succinate (a cardioselective β-blocker) 50 mg o.d.
- Yes, I want to add metoprolol succinate (a cardioselective β-blocker) in the lowest possible dose, and increase the dosage gradually
- Yes, I want to add spironolactone 25 mg o.d.
- No, I don't want to change drug prescriptions, Mr Peters is feeling fine now

Decision 2, CPG based response: Add metoprolol succinate in the lowest possible dose and increase the dosage gradually

Information block 3

During the last consultation you decided to continue furosemide 40 mg o.d., enalapril 10 mg b.i.d., and acetylsalicylic acid 80 mg o.d. You also added metoprolol succinate 12.5 mg o.d. with the intention to gradually increase the dosage of this β-blocker up to the maximal tolerated dosage over the coming weeks ('starting low, going slow').

We are **four weeks later** now, and Mr. Peters returns to the surgery for his next appointment. When asked for, he tells you that he tolerates the last prescribed drug well (metoprolol succinate; you have already increased the dosage to 25 mg o.d. two weeks ago), and does not experience any side effects, although, it seems somewhat harder to 'get going', and after his 'walking block' he feels somewhat more tired than before the start of metoprolol.

On physical examination, his blood pressure is 122/72 mmHg and his pulse is 72 bpm regular. No weight gain, no ankle oedema and normal pulmonary breathing sounds.

Question 3: What do you decide? Do you want to change his medication?

Options
- Yes, I want to double the β-blocker dosage
- No, Mr. Peters has some symptoms, therefore, no increase of β-blocker dosage now
- Yes, Mr. Peters has some symptoms, I therefore do not increase the dosage of metoprolol, but instead temporarily increase the dosage of furosemide
- Yes, I reduce metoprolol to 12.5 mg, because Mr. Peters has more symptoms and his blood pressure is too low
- Yes, I stop metoprolol, because Mr. Peters has more symptoms and his blood pressure is too low

Decision 3, CPG based response: Increase (i.e., double) the β-blocker dosage

Information block 4

Now, Mr Smith visits your surgery. He is similar to Mr Peters in every respect, except that he also has chronic obstructive pulmonary disease (COPD). He is on furosemide 40 mg o.d., enalapril 10 mg b.i.d., acetylsalicylic acid 80 mg o.d., and metoprolol succinate 50 mg o.d. (which seemed the maximum tolerated dose for Mr. Peters).

Apart from shortness of breath during exercise, he is regularly coughing with phlegm production. He gave up smoking some years ago, after 40 pack years of smoking.
His last pulmonary function test revealed a FEV1/FVC ratio of 62%, and a FEV1 of 68% of predicted. So besides HFREF, Mr Smith has also COPD, Gold Class II.

Question 4: You want to prescribe a long-acting β2-agonist by inhalation (e.g. salmeterol). Does prescription of salmeterol cause you to change the prescription of metoprolol in this patient?

Options

- Yes, I will increase the dosage of metoprolol to 100 mg o.d., because β2-mimetics partly block the effects of the β-blocker
- Yes, I want to lower the β-blocker dosage to 25 mg o.d. because of the risk of bronchospasm
- Yes, I want to lower the dosage of metoprolol to 25 mg o.d. because of the risk of bronchospasm, and furthermore increase the dosage of furosemide
- No, I want to continue metoprolol 50mg o.d. as it is, but opt for a long-acting anticholinergic inhaler instead of a β2-agonist, because you shouldn't combine cardioselective β-blockers with β2-agonists.
- No, I want to continue the β-blocker dosage as it is. You can combine cardioselective β-blockers with long-acting β2-agonists

Decision 4, CPG based response: No, adding a long acting β2-agonist to a cardioselective β-blocker is allowed.

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Do general practitioners follow treatment recommendations from guidelines in their decisions on heart failure management? A clinical vignette-based survey

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Article Focus

- Most general practitioners often see patients with heart failure.
- We studied whether general practitioners follow recommendations from clinical practice guidelines in their management of such patients
- We used a clinical vignette patient with heart failure and a reduced ejection fraction
- We assessed which doctor characteristics related to their management decisions

Key Messages

- In their management of heart failure patients GPs hardly appear to follow recommendations from clinical practice guidelines.
- Giving priority to evidence-based medicine appears related to following recommendations from clinical practice guidelines.
- Stopping statin treatment when a patient feels comfortable, or increasing β-blocker dose when a patient experiences more complaints, may appear as counterintuitive recommendations.

Strengths and Limitations

In total 451 GPs participated in our clinical vignette study. Unfortunately, the statistical power of our analyses on the relation of doctor characteristics as determinants of their management decisions was strongly reduced by the very few GPs that followed recommendations from clinical practice guidelines.

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ABSTRACT

Objective: To investigate whether general practitioners (GPs) follow treatment recommendations from clinical practice guidelines in their decisions on the management of heart failure patients, and assess whether doctors' characteristics are related to their decisions.

Design: Cross-sectional vignette study.

Setting: Continuing Medical Education meeting.

Participants: 451 Dutch GPs.

Main outcome measures: Answers to four multiple choice treatment decisions in clinical vignettes of a patient with heart failure and a reduced ejection fraction. With univariable and multivariable regression analyses, respondent characteristics were related to optimal treatment decisions.

Results: Of the 451 GPs, none took four optimal decisions: 7% considered stopping statin treatment, 36% initiated β-blocker treatment at a low-dose and 4% doubled the β-blocker in the up-titration phase. Finally, for our vignette patient now also suffering from chronic obstructive pulmonary disease, 45% of the GPs continued β-blocker therapy even when they considered prescribing a long-acting β2-agonist. While the relation between respondent characteristics and each decision was very different, none was independently associated with all four decisions. Giving priority to evidence-based medicine was independently related to stopping statin treatment and doubling the β-blocker in the up-titration phase.

Conclusions: GPs seem not to follow treatment recommendations from clinical practice guidelines in their decisions on the management of heart failure patients. The recommendations from guidelines may appear counterintuitive when statin treatment needs to be stopped when a patient feels comfortable, or when a β-blocker should be up-titrated in patients who experience more complaints. Giving priority to evidence-based medicine is possibly positive related to difficult treatment decisions.

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INTRODUCTION

Robust evidence is available about optimal management of patients with heart failure and a reduced ejection fraction (HF-REF).(1) This evidence is included in clinical practice guidelines (CPGs), which aim is to serve as up-to-date evidence summaries, to provide recommendations on medical decisions, to prevent unwarranted inter-doctor variation, and to promote best practice. However, counterintuitive recommendations, i.e. those in conflict with prior knowledge or common clinical practice, or those which are unclear or ambiguous seem most sensitive to poor agreement, acceptance and adherence.

Based on evaluation and reviews of patient records and insurance claims previous studies showed that adherence to guidelines on heart failure (HF) differs largely between physicians.(2-5) A systematic review reported that adherence to CPGs was increased among female practitioners, those of younger age, with a belief in EBM, and with feedback by peers.(6) Yet, research has failed to show a consistent relation between doctor characteristics and quality of care (3;7;8), while female sex was reported to be related to better physician's performance (8), and being part of a group practice was reported to improve optimal drug prescription in patients with cardiovascular disease.(3;7)

For any patient with cardiovascular disease, treatment with statins is generally considered useful. A fairly recent insight is that statins have only a neutral effect in patients with HF-REF.(9;10) Although recent guidelines on HF incorporate this evidence, they fail to provide a clear recommendation on stopping statins. While they mention the 'unproven benefit' of statins, they on the one hand advocate not to initiate statins, but on the other hand do advise neither to stop statins in patients with HF-REF, nor to consider potential interactions with polypharmacy.(1) Moreover, the willingness of a physician to stop this drug when a patient

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does not experience any adverse effects will probably be low. Therefore, a recommendation to stop statins in patients with HF-REF may appear counterintuitive.

While β-blockers were considered contra-indicated some decades ago, they are now viewed as mandatory in HF-REF. The large body of evidence on the effectiveness of β-blockers in HF-REF has been incorporated in HF guidelines since 2001. Nevertheless up-titration of β-blockers has not been adopted, in particular by general practitioners (GPs).(2;3) Moreover, qualitative studies showed that GPs tend to refrain from initiation and up-titration of β-blockers because of fear for adverse effects and interactions with comorbid conditions.(11;12) During β-blockers up-titration an initial reduction in exercise tolerance can be expected, and this certainly may have had an impact on the slow adoption of β-blocker treatment by physicians.(13) It is therefore that the currently available guidelines may appear counterintuitive when they recommend up-titration of β-blockers irrespective of both symptom severity and patient's water or salt retention.(2-5)

A more recent shift in management is that cardioselective β-blockers are no longer considered contra-indicated in chronic obstructive pulmonary disease (COPD) (14;15) as they were a decade ago. Since 2008, HF guidelines recommend not to withhold cardioselective β-blockers when indicated.(16) Since 2011, guidelines on COPD follow this recommendation.(17) Still, both guidelines do not provide clear recommendations on combining β-blockers with β2-agonists in patients with HF and concomitant COPD.

Clinical vignette surveys showed to be especially effective and efficient for the evaluation of inter-doctor variation in treatment decisions.(18;19) We therefore used a clinical vignette mimicking four common treatment decisions for an imaginary patient with HF-REF.

We thereby concentrated on CPG recommendations on the management of patients with HF regarding prescribing statins and β-blockers which for different reasons can be considered as

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counterintuitive, i.e., in conflict with common practice or prior knowledge, or can be considered as unclear. We also assessed whether GP characteristics were related to optimal treatment decisions.

METHODS

Setting and participants

We collected data during a two-day CME meeting for GPs in December 2010 in which a wide range of clinical topics were addressed, attracting GPs nationwide (Boerhaave meeting, Leiden, the Netherlands). The verbal introduction to the survey informed the GPs that our survey was about their management of heart failure; that a vignette with limited response options was used to collect the data using an electronic voting system; that the data they provided would be treated anonymously during collection, analyses and reporting. They had about 10 minutes to decide on their participation. We used an electronic voting system that prevented respondents from going back and forth between questions, and allowed a maximum of 60 seconds to respond. Participating GPs were instructed to make decisions that reflect their actual practice. To prevent carry-over effects, i.e., making interdependent inappropriate decisions, the best treatment decision was provided after each question but before the next information block and question. Data was collected anonymously.

Vignettes

We presented four information blocks on consecutive encounters with an imaginary patient with HF-REF (see Text Box). Each information block included details on signs, symptoms, additional investigations and diagnosis to arrive at the treatment decision in accordance with the CPG recommendations. At the end of each information-block we asked a multiple choice question with four or five decision options for the treatment decision. We asked respondents

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to select a response option within 2 minutes. Thereafter we asked them to indicate their level of confidence on the chosen treatment decision. The Dutch College of General Practitioners informs all general practitioners about their new and updated CPGs. CPGs are made available in print and through free online access at the website of the College.

In accordance with the evidence-based CPG treatment recommendations the decision for the first patient encounter was to stop statins (9;10), irrespective of the fact that the patient did not experience any adverse effects. For the second patient encounter, this was adding a low-dose β-blocker to ACE- inhibitors and diuretics in a clinically stable patient.(16;20) At the third encounter, doubling the β-blocker dosage was in accordance with the evidence-based CPG treatment recommendations, and not contraindicated because of the relapse in exercise tolerance.(16;20) At the fourth encounter for a patient with HF-REF and COPD, not withholding a cardioselective β-blocker irrespective of prescribing a long-acting inhalation β2-agonist was the decision in accordance with the evidence-based CPG treatment recommendations.(15;16;20)

Characteristics of respondent

Based on a review of the literature we considered age, sex, years in practice, practice size, current professional tasks and responsibilities, experience with doing research, decision making style, first acquaintance with EBM, priority given to EBM, sources consulted for keeping up-to-date with evidence, and perceived EBM performance of themselves and colleagues, as relevant putative determinants for quality of patient care and adherence to evidence-based CPGs. (3;6-8;21) We asked information from participating GPs about this, together with their confidence and preferred information sources for arriving at each treatment decision.

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Vignette pre-testing

Sixty-eight GPs participated in pre-test sessions in which they judged that the questions and the imaginary patient scenario were sufficiently genuine and representative of actual clinical practice. We also ensured that the wording was unambiguous. In addition, they did not encounter hidden prompts towards socially desirable answers nor cues to the evidence-based CPG treatment recommendations. Based on the pre-test sessions we finalized the vignette.

Data analyses

The respondent characteristics on priority given to EBM, own EBM performance, colleagues' EBM performance, and confidence on each treatment decision – all with a 9-point response scale – were dichotomised: 1 to 6 for low/poor and moderate/modest, and 7 to 9 for high/excellent. The scores for decision-making style – with a 9-point response scale – was dichotomised: 1 to 6 intuitive or mixed intuitive and rational, and 7 to 9 in rational.

We summed the four treatment decision confidence scores and dichotomised them in low to moderate (1 to 24), and high (25 to 36) overall confidence. We dichotomized the treatment decisions into those in accordance with CPG treatment recommendations or not. Before applying multivariate analysis, we assumed missing decisions to reflect 'wrong' decisions, and used unconditional median imputation for missing respondent characteristics. With multivariate logistic regression analyses we explored which GP characteristics were related to each of the decisions in accordance with CPG treatment recommendations. We included GP characteristics which had a univariate relationship with at least one treatment decision in accordance with CPG treatment recommendations (p-value ≤ 0.20). For the final multivariate model per treatment decision, we retained respondent characteristics with a p-value ≤ 0.10.

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We used SPSS, version 20.0 for Windows (SPSS Inc., Chicago, IL, USA) for all data analyses.

RESULTS

We obtained data from 451 respondents, i.e., 72% of the 623 GPs who signed the attendance list of the CME meeting. There were 10% missing data for decision point 1 and 4, 2% missing data for decision point 2, 5% for decision point 3. Seven respondent characteristics had fewer than 4% missings, and five characteristics had 4% or more missings, with a maximum of 10% for sex. The respondents resembled the Dutch GP population; most were male, about half were older than 50 years of age, and women were over-represented in the younger age categories. Most respondents had been in practice for more than 10 years, practiced alone or with one other GP, did not train GP registrars, and had no research experience (Table 1). Respondents preferred reading journals (30%), following CME (28%), and consulting Dutch GP guidelines (27%) for keeping up-to-date with evidence. About 40% of respondents gave EBM high priority, and rated their own EBM performance as excellent (Table 1).

Treatment decisions

The number of optimal treatment decisions was low for all four decisions (Table 2). While 195 GPs (43%) had high confidence about their first decision, 32 (7%) respondents considered to stop statin treatment. For the second decision, 171 GPs (38%) were highly confident, while 163 GPs (36%) decided to initiate a β-blocker at an appropriate low-dose. While 124 GPs (27%) were highly confident in their third decision, 17 (4%) decided to increase β-blocker dose to target for maximum tolerated dose irrespective of the fact that the patient had a relapse in exercise tolerance. For the fourth decision, 79 GPs (18%) were highly confident with their decision, while 202 (45%) decided to continue β-blockers even when a long-acting inhalation

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β2-agonist was considered necessary for the patient with HF-REF and COPD. Another 32% of GPs decided that β-blockers could not be combined with β2-agonists and therefore continued β-blockers with an inhalation anticholinergic.

None of the participants responded optimal to all four decision points, 9 (2%) GPs decided optimally for three decision points, 86 (19%) twice, and 215 (48%) once. Finally, 141 GPs (31%) never decided optimally.

Impact of respondent characteristics on treatment decisions

The distribution of appropriate treatment decisions for GP characteristics is shown in Table 3. Univariate analysis (data not shown) revealed that *age*, *sex* (male), *number of years in practice* (more than 20 years), *research experience* (none), *first acquaintance with EBM* (after medical school or residency), *EBM performance of GP colleagues* (low or moderate), *giving priority to EBM* (high), and *overall confidence* across four treatment decisions (high) were all related to both the decision to stop statin treatment and the decision to double β-blocker dosage.

Table 4 shows the results of the multivariate analysis for GP characteristics with an univariate relationship with at least one decision in accordance with CPG treatment recommendations. These multivariate analyses showed that *age* was independently associated with three decisions; *number of years in practice, first acquaintance with EBM*, *priority given to EBM*, and *EBM performance of GP colleagues* were each associated with two decisions. Only high *priority given to EBM* show a significant independent association with two decisions in a consistent direction: stopping statin treatment and doubling β-blocker dosage. The other doctor characteristics assessed during multivariate analysis were related to one treatment decision (Table 4). During neither univariate nor multivariate analysis, any of the doctor

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characteristics was related to accordance with CPG recommendations on all four treatment decisions.

DISCUSSION

Most treatment decisions by GPs on prescribing statins and β-blockers in a clinical vignette patient with HF-REF were not in accordance with recommendations from available CPGs. While in particular recommendations which may appear counterintuitive, i.e., conflicting with common practice or prior knowledge, adherence will be low, weak recommendations seem most sensitive to poor agreement, acceptance and adherence. Moreover, unclear or ambiguous recommendations clearly will give rise to non-adherence.

None of the relevant doctor characteristics was related to accordance with CPG recommendations on all four treatment decisions. But encouragingly, giving high priority to EBM in clinical practice was associated with the decision to stop statins while the patient does not mention any adverse effect, and with the decision to up-titrate β-blockers while the patient experienced a commonly associated and therefore predictable relapse in exercise tolerance.

Some aspects of our findings deserve further consideration. First, our study setting (Boerhaave) may have been somewhat artificial and this may have contributed to the low number of GPs taking decisions in accordance with the CPG recommendations. Still, our approach to data collection, notably clinical vignette surveys with self-reported responses, has been shown to be effective and efficient in evaluating variation in treatment decisions.(18;19) Moreover, our use of multiple-choice response options, rather than an open-ended format,

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may have resulted in either or both an underestimation of actual practice variation (19) and overestimation of doctor performance.(22)

Second, numerous participating GPs may have been reluctant to stop statins when a patient feels comfortable with them (decision 1), while many were hesitant to initiate β-blocker treatment (decision 2) or to up-titrate the β-blocker to the recommended dose, even if the complaints of patients turn out to be no contra-indication for this (decision 3). Furthermore, many turned out to be rather cautious to combine β-blockers with a long-acting inhalation β2-agonist in the management of patients with HF-REF and COPD (decision 4).

Third, our vignettes concern CPG recommendations on the management of HF-REF patients which, to some extent and for different reasons may appear counterintuitive or can be considered ambiguous or unclear. Therefore, one might question whether and when it is appropriate for a GP to follow CPG recommendations in the management of HF-REF patients. While the Dutch and ESC guidelines clearly recommend not to initiate statins for patients with HF-REF, they do not advise to stop.(1, 16, 20) We think, however, that continuing a drug that is not shown to be beneficial is a waste of money, and especially in patients with HF-REF the risk of polypharmacy. . We think, however, that continuing a drug that is not shown to be beneficial is a waste of money. In particular in patients with HF-REF where polypharmacy is often seen, careful medication management is justified in order to prevent harm or interactions.

The evidence on the effectiveness of β-blockers for HF-REF is available for more than a decade, (23-29) and their careful up-titration is advocated in the available CPGs on HF.(16;20) Still, previous qualitative studies showed that GPs were unfamiliar with their beneficial effects and poorly adhered to the latest guidelines with respect to β-blockers.(11;12) While β-blocker intolerance in HF-REF is very low (5;11;12), GP are hesitant to prescribe β-blockers because of individual prior negative experiences and their

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concerns about harmful effects.(11) While CPGs discuss continuation of β-blockers, preferably cardioselective ones in patients with HF-REF and COPD, they provide no clear recommendation about combining β-blockers with β2-agonists.(16;20) Combining β-blockers and β2-agonists may seem counterintuitive, but adverse effects are very rare. (14;15) Certainly, GPs may have been confused by contradictory recommendations from current (i.e., up to 2011) guidelines in cardiology advocating not to refrain from β-blockers in patients with COPD, and guidelines in pulmonology discussing β-blockers as (relatively) contraindicated in patients with COPD. It should be noted that after data for this study had been collected, the pulmonology guidelines that have been issued in 2011 recommend β-blockers in HF patients with COPD.(17) Still, in CPGs conclusions on the evidence and the recommendations based thereupon should be stated more transparently, and should be separated more explicitly.

Finally, although our findings on the poor adherence to CPG recommendations may have important implications for patient care, they may have been subject to chance. Moreover, despite our large sample size, the low number of decisions in accordance with CPG recommendations decreased statistical power to identify characteristics related to adherence to CPG recommendation. Still, the associations between doctor characteristics and adherence to CPG recommendations that have been reported to date were weak and lacked consistency across studies.(3;7;8)

While the CPG recommendations for the management of patients with HF-REF are unclear or ambiguous, or may appear counterintuitive, we conclude that GPs appear not to follow evidence-based CPG recommendations in their decisions on prescribing statins and β-blockers for patients with HF-REF. None of the relevant respondent characteristics was consistently associated with decisions in accordance with CPG recommendations. Encouragingly, giving high priority to EBM in clinical practice was related to adherence to the guidelines for more decisions.

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Ethics approval The study was performed in accordance with the principles outlined in the Declaration of Helsinki, and the Medical Ethics Committee of the University Medical Centre Utrecht, The Netherlands provided a waiver for informed consent of participants.

Contributorship statement

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Collection and assembly of data

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Conflict of interest statement

The authors have declared that no competing interests exist.

Data sharing statement

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Table 1. Baseline characteristics of the 451 responding GPs

Doctor characteristics		N (%)
Sex [a]	Male	266 (62)
	Female	162 (38)
Age (yrs) [b]	21-50	189 (47)
	51 +	217 (53)
Years in practice [a]	0 – 20	218 (50)
	21 +	219 (50)
Practice size [a]	Solo practice	104 (24)
	Duo or group practice	334 (76)
Current job [b]	GP only	306 (72)
	GP plus other †	120 (28)
Research experience [a]	No	341 (78)
	Yes	99 (22)
First acquaintance with EBM [a]	Medical school or residency	234 (53)
	After GP certification, while doing research	208 (47)
Priority given to EBM in own daily practice [a]	Low or moderate	239 (55)
	High	193 (45)
Own EBM performance [a]	Poor or moderate	253 (58)
	Excellent	186 (42)
EBM performance of GP colleagues [a]	Poor or moderate	272 (62)
	Excellent	164 (48)
Decision making style [a]	Strong intuition or mixed	305 (70)
	Strong ratio	128 (30)
Preferred source || for keeping up-to-date with evidence [a]	Oral reference	139 (32)
	Written reference	302 (68)

Legend to Table 1

Missing data. a: <5%; b: 5%<>10%

† Other = registrar supervision, research, education, management.

|| Oral reference, i.e., colleagues, specialists, pharmaceutical reps or CME. Written reference, i.e., internet, guidelines, handbooks or journals.

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Table 2. Number (%) of respondents with CPG based treatment decisions

		Decision 1 Stop statin	Decision 2 Start low dose β-blocker	Decision 3 Double dose of β-blocker	Decision 4 Continue β-blocker in COPD
GPB based decision		**32 (7)**	**163 (36)**	**17 (4)**	**202 (45)**
Confidence per treatment decisions §	High	195 (43)	171 (38)	124 (27)	79 (18)
	Moderate or low	256 (57)	280 (62)	327 (73)	372 (82)
	Mean (sd)	*6 (2)*	*6 (2)*	*5 (2)*	*4 (2)*

† Number of respondents (n=451) with four CPG based decisions

§ Confidence per treatment decision: the 9 point ordinal scale ranging from 1 (lowest possible confidence in appropriateness of decision) to 9 (highest possible confidence in appropriateness of decision) was dichotomised to high (7 to 9), moderate or low (1 to 6).

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Table 3. Proportion respondents with CPG based treatment decisions per doctor characteristic

			Decision 1 **Stop statin**	Decision 2 **Start low dose β-blocker**	Decision 3 **Double dose of β-blocker**	Decision 4 **Continue β-blocker in COPD**
Doctor characteristic	**Status**	**N**	**%**	**%**	**%**	**%**
Sex	Male	266	9	42	5	43
	Female	162	5	29	2	47
Age (yrs)	21-50	189	4	37	5	47
	51+70	217	11	36	3	44
Years in practice	0 – 20	218	5	37	2	43
	21 +	219	9	36	5	44
Practice size	Solo practice	104	20	98	11	118
	Duo or group practice	334	2	17	2	21
Current job	GP	306	8	49	5	56
	GP plus	120	4	8	0	13
Research experience	No	341	8	39	4	45
	Yes	99	5	27	2	44
First acquaintance to EBM	Med school / residency	234	12	65	6	79
	During research	208	1	4	0	3
Priority given to EBM	Low or moderate	239	5	38	3	47
	High	193	9	36	6	44
Own EBM performance	Poor or moderate	253	8	37	3	43
	Excellent	186	6	35	4	44
EBM performance of GP colleagues	Poor or moderate	272	8	40	5	44
	Excellent	164	5	30	2	45
Decision making style	Intuitive or mixed	305	8	36	3	43
	Rational	128	5	38	5	48
Confidence per treatment decision	Low or moderate	274	7	30	4	60
	High	114	11	71	5	30
Preferred source for keeping up-to-date	Oral reference ‖	139	10	34	3	44
	Written reference ‖	302	6	37	4	43

Legend to Table 3

§ Overall confidence across treatment decisions, i.e., sum of confidence scores of all four treatment decisions. In 14% of the participants there was one or more of the four confidence scores missing.

‖ Oral reference, i.e., colleagues, specialists, pharmaceutical reports or CME. Written reference, i.e., internet, guidelines, handbooks or journals.

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Table 4.

Independent associations *(multivariate odds ratio and their 95% CI)* between doctor characteristics (n=451 GPs) and CPG based treatment decisions

		Decision 1 Stop statin	Decision 2 Start β-blocker at low dose	Decision 3 Double dose of β-blocker	Decision 4 Continue β-blocker in COPD
Sex	Male		-		
	Female		0.58 (0.37;0.92)		
Age (yr)	21-50	-		-	-
	51+	2.13 (0.90;5.01)		0.18 (0.04;0.72)	0.60 (0.37;0.98)
Years in practice	0-20			-	
	21+			6.15 (1.49;25.3)	
First acquaintance with EBM	Medical school/ residency		-		-
	Afterwards or during research		0.67 (0.43;1.04)		1.64 (1.01;2.66)
Priority given to EBM	Low or moderate	-		-	
	High	1.70 (0.77;3.74)		2.88 (0.94;8.90)	
EBM performance of GP colleagues	Poor or moderate		-	-	
	Excellent		0.57 (0.37;0.88)	0.36 (0.10;1.31)	
Confidence in treatment decision	Low or moderate		-		
	High		2.27 (1.49;3.46)		
Overall confidence across four treatment decisions	Low or moderate				-
	High				0.91 (0.60;1.36)
Preferred source for keeping up-to-date	Oral reference †	-			
	Written reference †	2.41 (1.10;5.31)			

Legend to Table 4

† Oral reference, i.e., colleagues, specialists, pharmaceutical reports, or CME. Written reference, i.e., internet, guidelines, handbooks or journals.

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Do general practitioners follow treatment recommendations from guidelines in their decisions on heart failure management? A clinical vignette-based survey

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Article Focus

- Most general practitioners often see patients with heart failure.
- We studied whether general practitioners follow recommendations from clinical practice guidelines in their management of such patients
- We used a clinical vignette patient with heart failure and a reduced ejection fraction
- We assessed which doctor characteristics related to their management decisions

Key Messages

- In their management of heart failure patients GPs hardly appear to follow recommendations from clinical practice guidelines.
- Giving priority to evidence-based medicine appears related to following recommendations from clinical practice guidelines.
- Stopping statin treatment when a patient feels comfortable, or increasing β-blocker dose when a patient experiences more complaints, may appear as counterintuitive recommendations.

Strengths and Limitations

In total 451 GPs participated in our clinical vignette study. Unfortunately, the statistical power of our analyses on the relation of doctor characteristics as determinants of their management decisions was strongly reduced by the very few GPs that followed recommendations from clinical practice guidelines.

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ABSTRACT

Objective: To investigate whether general practitioners (GPs) follow treatment recommendations from clinical practice guidelines in their decisions on the management of heart failure patients, and assess whether doctors' characteristics are related to their decisions.

Design: Cross-sectional vignette study.

Setting: Continuing Medical Education meeting.

Participants: 451 Dutch GPs.

Main outcome measures: Answers to four multiple choice treatment decisions in clinical vignettes of a patient with heart failure and a reduced ejection fraction. With univariable and multivariable regression analyses, respondent characteristics were related to optimal treatment decisions.

Results: Of the 451 GPs, none took four optimal decisions: 7% considered stopping statin treatment, 36% initiated β-blocker treatment at a low-dose and 4% doubled the β-blocker in the up-titration phase. Finally, for our vignette patient now also suffering from chronic obstructive pulmonary disease, 45% of the GPs continued β-blocker therapy even when they considered prescribing a long-acting β2-agonist. While the relation between respondent characteristics and each decision was very different, none was independently associated with all four decisions. Giving priority to evidence-based medicine was independently related to stopping statin treatment and doubling the β-blocker in the up-titration phase.

Conclusions: GPs seem not to follow treatment recommendations from clinical practice guidelines in their decisions on the management of heart failure patients. The recommendations from guidelines may appear counterintuitive when statin treatment needs to be stopped when a patient feels comfortable, or when a β-blocker should be up-titrated in patients who experience more complaints. Giving priority to evidence-based medicine is possibly positive related to difficult treatment decisions.

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INTRODUCTION

Robust evidence is available about optimal management of patients with heart failure and a reduced ejection fraction (HF-REF).(1) This evidence is included in clinical practice guidelines (CPGs), which aim is to serve as up-to-date evidence summaries, to provide recommendations on medical decisions, to prevent unwarranted inter-doctor variation, and to promote best practice. However, counterintuitive recommendations, i.e. those in conflict with prior knowledge or common clinical practice, or those which are unclear or ambiguous seem most sensitive to poor agreement, acceptance and adherence.

Based on evaluation and reviews of patient records and insurance claims previous studies showed that adherence to guidelines on heart failure (HF) differs largely between physicians.(2-5) A systematic review reported that adherence to CPGs was increased among female practitioners, those of younger age, with a belief in EBM, and with feedback by peers.(6) Yet, research has failed to show a consistent relation between doctor characteristics and quality of care (3;7;8), while female sex was reported to be related to better physician's performance (8), and being part of a group practice was reported to improve optimal drug prescription in patients with cardiovascular disease.(3;7)

For any patient with cardiovascular disease, treatment with statins is generally considered useful. A fairly recent insight is that statins have only a neutral effect in patients with HF-REF.(9;10) Although recent guidelines on HF incorporate this evidence, they fail to provide a clear recommendation on stopping statins. While they mention the 'unproven benefit' of statins, they on the one hand advocate not to initiate statins, but on the other hand do advise neither to stop statins in patients with HF-REF, nor to consider potential interactions with polypharmacy.(1) Moreover, the willingness of a physician to stop this drug when a patient

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does not experience any adverse effects will probably be low. Therefore, a recommendation to stop statins in patients with HF-REF may appear counterintuitive.

While β-blockers were considered contra-indicated some decades ago, they are now viewed as mandatory in HF-REF. The large body of evidence on the effectiveness of β-blockers in HF-REF has been incorporated in HF guidelines since 2001. Nevertheless up-titration of β-blockers has not been adopted, in particular by general practitioners (GPs).(2;3) Moreover, qualitative studies showed that GPs tend to refrain from initiation and up-titration of β-blockers because of fear for adverse effects and interactions with comorbid conditions.(11;12) During β-blockers up-titration an initial reduction in exercise tolerance can be expected, and this certainly may have had an impact on the slow adoption of β-blocker treatment by physicians.(13) It is therefore that the currently available guidelines may appear counterintuitive when they recommend up-titration of β-blockers irrespective of both symptom severity and patient's water or salt retention.(2-5)

A more recent shift in management is that cardioselective β-blockers are no longer considered contra-indicated in chronic obstructive pulmonary disease (COPD) (14;15) as they were a decade ago. Since 2008, HF guidelines recommend not to withhold cardioselective β-blockers when indicated.(16) Since 2011, guidelines on COPD follow this recommendation.(17) Still, both guidelines do not provide clear recommendations on combining β-blockers with β2-agonists in patients with HF and concomitant COPD.

Clinical vignette surveys showed to be especially effective and efficient for the evaluation of inter-doctor variation in treatment decisions.(18;19) We therefore used a clinical vignette mimicking four common treatment decisions for an imaginary patient with HF-REF.

We thereby concentrated on CPG recommendations on the management of patients with HF regarding prescribing statins and β-blockers which for different reasons can be considered as

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counterintuitive, i.e., in conflict with common practice or prior knowledge, or can be considered as unclear. We also assessed whether GP characteristics were related to optimal treatment decisions.

METHODS

Setting and participants

We collected data during a two-day CME meeting for GPs in December 2010 in which a wide range of clinical topics were addressed, attracting GPs nationwide (Boerhaave meeting, Leiden, the Netherlands). The verbal introduction to the survey informed the GPs that our survey was about their management of heart failure; that a vignette with limited response options was used to collect the data using an electronic voting system; that the data they provided would be treated anonymously during collection, analyses and reporting. They had about 10 minutes to decide on their participation. We used an electronic voting system that prevented respondents from going back and forth between questions, and allowed a maximum of 60 seconds to respond. Participating GPs were instructed to make decisions that reflect their actual practice. To prevent carry-over effects, i.e., making interdependent inappropriate decisions, the best treatment decision was provided after each question but before the next information block and question. Data was collected anonymously.

Vignettes

We presented four information blocks on consecutive encounters with an imaginary patient with HF-REF (see Text Box). Each information block included details on signs, symptoms, additional investigations and diagnosis to arrive at the treatment decision in accordance with the CPG recommendations. At the end of each information-block we asked a multiple choice question with four or five decision options for the treatment decision. We asked respondents

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to select a response option within 2 minutes. Thereafter we asked them to indicate their level of confidence on the chosen treatment decision. The Dutch College of General Practitioners informs all general practitioners about their new and updated CPGs. CPGs are made available in print and through free online access at the website of the College.

In accordance with the evidence-based CPG treatment recommendations the decision for the first patient encounter was to stop statins (9;10), irrespective of the fact that the patient did not experience any adverse effects. For the second patient encounter, this was adding a low-dose β-blocker to ACE- inhibitors and diuretics in a clinically stable patient.(16;20) At the third encounter, doubling the β-blocker dosage was in accordance with the evidence-based CPG treatment recommendations, and not contraindicated because of the relapse in exercise tolerance.(16;20) At the fourth encounter for a patient with HF-REF and COPD, not withholding a cardioselective β-blocker irrespective of prescribing a long-acting inhalation β2-agonist was the decision in accordance with the evidence-based CPG treatment recommendations.(15;16;20)

Characteristics of respondent

Based on a review of the literature we considered age, sex, years in practice, practice size, current professional tasks and responsibilities, experience with doing research, decision making style, first acquaintance with EBM, priority given to EBM, sources consulted for keeping up-to-date with evidence, and perceived EBM performance of themselves and colleagues, as relevant putative determinants for quality of patient care and adherence to evidence-based CPGs. (3;6-8;21) We asked information from participating GPs about this, together with their confidence and preferred information sources for arriving at each treatment decision.

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Vignette pre-testing

Sixty-eight GPs participated in pre-test sessions in which they judged that the questions and the imaginary patient scenario were sufficiently genuine and representative of actual clinical practice. We also ensured that the wording was unambiguous. In addition, they did not encounter hidden prompts towards socially desirable answers nor cues to the evidence-based CPG treatment recommendations. Based on the pre-test sessions we finalized the vignette.

Data analyses

The respondent characteristics on priority given to EBM, own EBM performance, colleagues' EBM performance, and confidence on each treatment decision – all with a 9-point response scale – were dichotomised: 1 to 6 for low/poor and moderate/modest, and 7 to 9 for high/excellent. The scores for decision-making style – with a 9-point response scale – was dichotomised: 1 to 6 intuitive or mixed intuitive and rational, and 7 to 9 in rational.

We summed the four treatment decision confidence scores and dichotomised them in low to moderate (1 to 24), and high (25 to 36) overall confidence. We dichotomized the treatment decisions into those in accordance with CPG treatment recommendations or not. Before applying multivariate analysis, we assumed missing decisions to reflect 'wrong' decisions, and used unconditional median imputation for missing respondent characteristics. With multivariate logistic regression analyses we explored which GP characteristics were related to each of the decisions in accordance with CPG treatment recommendations. We included GP characteristics which had a univariate relationship with at least one treatment decision in accordance with CPG treatment recommendations (p-value ≤ 0.20). For the final multivariate model per treatment decision, we retained respondent characteristics with a p-value ≤ 0.10.

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We used SPSS, version 20.0 for Windows (SPSS Inc., Chicago, IL, USA) for all data analyses.

RESULTS

We obtained data from 451 respondents, i.e., 72% of the 623 GPs who signed the attendance list of the CME meeting. There were 10% missing data for decision point 1 and 4, 2% missing data for decision point 2, 5% for decision point 3. Seven respondent characteristics had fewer than 4% missings, and five characteristics had 4% or more missings, with a maximum of 10% for sex. The respondents resembled the Dutch GP population; most were male, about half were older than 50 years of age, and women were over-represented in the younger age categories. Most respondents had been in practice for more than 10 years, practiced alone or with one other GP, did not train GP registrars, and had no research experience (Table 1). Respondents preferred reading journals (30%), following CME (28%), and consulting Dutch GP guidelines (27%) for keeping up-to-date with evidence. About 40% of respondents gave EBM high priority, and rated their own EBM performance as excellent (Table 1).

Treatment decisions

The number of optimal treatment decisions was low for all four decisions (Table 2). While 195 GPs (43%) had high confidence about their first decision, 32 (7%) respondents considered to stop statin treatment. For the second decision, 171 GPs (38%) were highly confident, while 163 GPs (36%) decided to initiate a β-blocker at an appropriate low-dose. While 124 GPs (27%) were highly confident in their third decision, 17 (4%) decided to increase β-blocker dose to target for maximum tolerated dose irrespective of the fact that the patient had a relapse in exercise tolerance. For the fourth decision, 79 GPs (18%) were highly confident with their decision, while 202 (45%) decided to continue β-blockers even when a long-acting inhalation

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β2-agonist was considered necessary for the patient with HF-REF and COPD. Another 32% of GPs decided that β-blockers could not be combined with β2-agonists and therefore continued β-blockers with an inhalation anticholinergic.

None of the participants responded optimal to all four decision points, 9 (2%) GPs decided optimally for three decision points, 86 (19%) twice, and 215 (48%) once. Finally, 141 GPs (31%) never decided optimally.

Impact of respondent characteristics on treatment decisions

The distribution of appropriate treatment decisions for GP characteristics is shown in Table 3. Univariate analysis (data not shown) revealed that *age*, *sex* (male), *number of years in practice* (more than 20 years), *research experience* (none), *first acquaintance with EBM* (after medical school or residency), *EBM performance of GP colleagues* (low or moderate), *giving priority to EBM* (high), and *overall confidence* across four treatment decisions (high) were all related to both the decision to stop statin treatment and the decision to double β-blocker dosage.

Table 4 shows the results of the multivariate analysis for GP characteristics with an univariate relationship with at least one decision in accordance with CPG treatment recommendations. These multivariate analyses showed that *age* was independently associated with three decisions; *number of years in practice, first acquaintance with EBM*, *priority given to EBM*, and *EBM performance of GP colleagues* were each associated with two decisions. Only high *priority given to EBM* show a significant independent association with two decisions in a consistent direction: stopping statin treatment and doubling β-blocker dosage. The other doctor characteristics assessed during multivariate analysis were related to one treatment decision (Table 4). During neither univariate nor multivariate analysis, any of the doctor

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characteristics was related to accordance with CPG recommendations on all four treatment decisions.

DISCUSSION

Most treatment decisions by GPs on prescribing statins and β-blockers in a clinical vignette patient with HF-REF were not in accordance with recommendations from available CPGs. While in particular recommendations which may appear counterintuitive, i.e., conflicting with common practice or prior knowledge, adherence will be low, weak recommendations seem most sensitive to poor agreement, acceptance and adherence. Moreover, unclear or ambiguous recommendations clearly will give rise to non-adherence.

~~In particular recommendations which may appear counterintuitive, i.e., conflicting with common practice or prior knowledge adherence will be low.~~

None of the relevant doctor characteristics was related to accordance with CPG recommendations on all four treatment decisions. But encouragingly, giving high priority to EBM in clinical practice was associated with the decision to stop statins while the patient does not mention any adverse effect, and with the decision to up-titrate β-blockers while the patient experienced a commonly associated and therefore predictable relapse in exercise tolerance.

Some aspects of our findings deserve further consideration. First, our study setting (Boerhaave) may have been somewhat artificial and this may have contributed to the low number of GPs taking decisions in accordance with the CPG recommendations. Still, our approach to data collection, notably clinical vignette surveys with self-reported responses, has been shown to be effective and efficient in evaluating variation in treatment decisions.(18;19) Moreover, our use of multiple-choice response options, rather than an open-ended format,

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may have resulted in either or both an underestimation of actual practice variation (19) and overestimation of doctor performance.(22)

Second, numerous participating GPs may have been reluctant to stop statins when a patient feels comfortable with them (decision 1), while many were hesitant to initiate β-blocker treatment (decision 2) or to up-titrate the β-blocker to the recommended dose, even if the complaints of patients turn out to be no contra-indication for this (decision 3). Furthermore, many turned out to be rather cautious to combine β-blockers with a long-acting inhalation β2-agonist in the management of patients with HF-REF and COPD (decision 4).

Third, our vignettes concern CPG recommendations on the management of HF-REF patients which, to some extent and for different reasons may appear counterintuitive or can be considered ambiguous or unclear. Therefore, one might question whether and when it is appropriate for a GP to follow CPG recommendations in the management of HF-REF patients. While the Dutch and ESC guidelines ~~CPGs~~ clearly recommend not to initiate statins for patients with HF-REF, they do not advise to stop.(1, 16, 20) We think, however, that continuing a drug that is not shown to be beneficial is a waste of money, and especially in patients with HF-REF the risk of polypharmacy. ~~and interactions is high~~. We think, however, that continuing a drug that is not shown to be beneficial is a waste of money. In particular in patients with HF-REF where polypharmacy is often seen, careful medication management is justified in order to prevent harm or interactions.

The evidence on the effectiveness of β-blockers for HF-REF is available for more than a decade, (23-29) and their careful up-titration is advocated in the available CPGs on HF.(16;20) Still, previous qualitative studies showed that GPs were unfamiliar with their beneficial effects and poorly adhered to the latest guidelines with respect to β-blockers.(11;12) While β-blocker intolerance in HF-REF is very low (5;11;12), GP are hesitant to prescribe β-blockers because of individual prior negative experiences and their

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concerns about harmful effects.(11) While CPGs discuss continuation of β-blockers, preferably cardioselective ones in patients with HF-REF and COPD, they provide no clear recommendation about combining β-blockers with β2-agonists.(16;20) Combining β-blockers and β2-agonists may seem counterintuitive, but adverse effects are very rare. (14;15) Certainly, GPs may have been confused by contradictory recommendations from current (i.e., up to 2011) guidelines in cardiology advocating not to refrain from β-blockers in patients with COPD, and guidelines in pulmonology discussing β-blockers as (relatively) contraindicated in patients with COPD. It should be noted that after data for this study had been collected, the pulmonology guidelines that have been issued in 2011 recommend β-blockers in HF patients with COPD.(17) Still, in CPGs conclusions on the evidence and the recommendations based thereupon should be stated more transparently, and should be separated more explicitly.

Finally, although our findings on the poor adherence to CPG recommendations may have important implications for patient care, they may have been subject to chance. Moreover, despite our large sample size, the low number of decisions in accordance with CPG recommendations decreased statistical power to identify characteristics related to adherence to CPG recommendation. Still, the associations between doctor characteristics and adherence to CPG recommendations that have been reported to date were weak and lacked consistency across studies.(3;7;8)

While the CPG recommendations for the management of patients with HF-REF are unclear or ambiguous, or may appear counterintuitive, we conclude that GPs appear not to follow evidence-based CPG recommendations in their decisions on prescribing statins and β-blockers for patients with HF-REF. None of the relevant respondent characteristics was consistently associated with decisions in accordance with CPG recommendations. Encouragingly, giving high priority to EBM in clinical practice was related to adherence to the guidelines for more decisions.

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Ethics approval The study was performed in accordance with the principles outlined in the Declaration of Helsinki, and the Medical Ethics Committee of the University Medical Centre Utrecht, The Netherlands provided a waiver for informed consent of participants.

Contributorship statement

Conception and design of study

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Conception and design of patient vignette

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Collection and assembly of data

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Analysis and interpretation of the data

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Conflict of interest statement

The authors have declared that no competing interests exist.

Data sharing statement

There is no additional data available.

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Text Box (revised version May 28, 2013)

Clinical vignette on imaginary patient with heart failure and a reduced ejection fraction

Information block 1

Mr. Peters, male, 72 years of age visits your GP surgery because he increasingly experiences shortness of breath during exercise. He has no chest pain.

Medical history: Hypertension since 1988, and an anterior wall myocardial infarction in 2001.
Medication use: chlorthalidone 12.5 mg o.d.; enalapril 5 mg b.i.d.; acetylsalicylic acid 80 mg o.d.; simvastatin 40 mg o.d.

Physical examination: blood pressure 146/87 mmHg, pulse 92 bpm regular, a broadened and sustained apical impulse in left decubital position, and normal pulmonary breathing sounds.

Additional tests:
- plasma amino-terminal B-type Natriuretic Peptide (NT-proBNP) level 1010 pg/ml (completely normal when <125 pg/ml ≈ 15 pmol/l)
- ECG showing abnormal Q-waves suggestive for prior MI
- Echocardiography: a somewhat dilated heart with wall movement abnormalities compatible with a prior MI, and a left ventricular ejection fraction (LVEF) of 30%. No clinical relevant valvular disease.

Conclusion: Heart failure with a reduced ejection fraction caused by long-term HT and prior MI.

Question for decision 1: What do you decide? Do you continue or stop prescribing simvastatin?

Response options for decision 1
1. Continue, because heart failure is a cardiovascular disease
2. Continue, but only if the patient would have heart failure with preserved ejection fraction
3. Continue, but only in patients with HF-REF and a history of ischemic heart disease
4. Stop, because statins do not have added value in patients with HF-REF

Decision 1: response option #4

Information on decision 1 from Dutch CPG:
- "HF is not a reason to start a statin. In case patients with HF use a statin for another indication, this treatment is continued."
- "Most studies about the effects of statins excluded patient with HF. The CORONA-study evaluated the effect of rovustatin in systolic HF with an ischemic aetiology. There was no effect on the primary outcome cardiovascular death, myocardial infarction or CVA' nor on death. Only the number of hospital admissions regarding cardiovascular indications decreased [Kjekshus 2007]. Also, in GISSI-HF, an RCT on the effectiveness of statins on HF and with a follow up of four years, found no effect of rovustatin on the combined outcome 'death or hospitalization for cardiovascular indications' [Tavazzi, 2008]."

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Clinical vignette on imaginary patient with heart failure and a reduced ejection fraction

Information block 2

During the last consultation you decided to stop simvastatin, and additionally, you changed chlorthalidone to furosemide 40 mg o.d., and doubled the dosage of enalapril to 10 mg b.i.d.

Now, **4 weeks later** Mr. Peters consults you again. He feels much better now. His exercise tolerance has increased and he feels less tired during and after exercise: "I can walk a larger distance now." On physical examination his blood pressure is 142/84 mmHg, and the pulse 84 bpm, regular. He has normal breathing sounds and there are no signs of peripheral oedema.

Question for decision 2: Do you want to change the medical prescription of Mr Peters?

Response options for decision 2

1. Yes, I want to add metoprolol succinate (a cardioselective β-blocker) 50 mg o.d.
2. Yes, I want to add metoprolol succinate (a cardioselective β-blocker) in the lowest possible dose, and increase the dosage gradually
3. Yes, I want to add spironolactone 25 mg o.d.
4. No, I don't want to change drug prescriptions, Mr Peters is feeling fine now

Decision 2: response option # 2

Information on decision 2 from Dutch CPG:

- "Beta-blockers are indicated in patients with systolic HF. Before starting with beta-blockers the patient needs to be clinically stable, to be at the optimal dose of ACE-inhibitors and/or AII-antagonist, and to have no clinical signs of fluid retention."
- "Metoprololsuccinate: start with 12,5/25 mg o.d. – target dose 200 mg o.d."
- "Dose uptitration every 2-4 weeks; it is custom to stepwise double the doses up to the target dose or up to the maximum tolerated dose."

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Clinical vignette on imaginary patient with heart failure and a reduced ejection fraction

Information block 3

During the last consultation you decided to continue furosemide 40 mg o.d., enalapril 10 mg b.i.d., and acetylsalicylic acid 80 mg o.d. You also added metoprolol succinate 12.5 mg o.d. with the intention to gradually increase the dosage of this β-blocker up to the maximal tolerated dosage over the coming weeks ('starting low, going slow').

We are **four weeks later** now, and Mr. Peters returns to the surgery for his next appointment. When asked for, he tells you that he tolerates the last prescribed drug well (metoprolol succinate; you have already increased the dosage to 25 mg o.d. two weeks ago), and does not experience any side effects, although, it seems somewhat harder to 'get going', and after his 'walking block' he feels somewhat more tired than before the start of metoprolol.

On physical examination, his blood pressure is 122/72 mmHg and his pulse is 72 bpm regular. No weight gain, no ankle oedema and normal pulmonary breathing sounds.

Question for decision 3: What do you decide? Do you want to change his medication?

Response options for decision 3

1. Yes, I want to double the β-blocker dosage
2. No, Mr. Peters has some symptoms, therefore, no increase of β-blocker dosage now
3. Yes, Mr. Peters has some symptoms, I therefore do not increase the dosage of metoprolol, but instead temporarily increase the dosage of furosemide
4. Yes, I reduce metoprolol to 12.5 mg, because Mr. Peters has more symptoms and his blood pressure is too low
5. Yes, I stop metoprolol, because Mr. Peters has more symptoms and his blood pressure is too low

Decision 3: response option #1

Information on decision 3 from Dutch CPG:

- "Metoprololsuccinate: start with 12,5/25 mg o.d. – target dose 200 mg o.d."
- "Dose uptitration every 2-4 weeks; some patient require a slower uptitration because beta-blockers can sometimes temporarily worsen complaints. Do not raise the dose in case of signs of exacerbation of HF (i.e., more fluid retention), symptomatic hypotension (e.g., dizziness when standing up) or bradycardia (< 50/min). It is custom to stepwise double the doses up to the target dose or up to the maximum tolerated dose."

Text Box (revised version May 28, 2013)

Clinical vignette on imaginary patient with heart failure and a reduced ejection fraction

Information block 4

Now, Mr Smith visits your surgery. He is similar to Mr Peters in every respect, except that he also has chronic obstructive pulmonary disease (COPD). He is on furosemide 40 mg o.d., enalapril 10 mg b.i.d., acetylsalicylic acid 80 mg o.d., and metoprolol succinate 50 mg o.d. (which seemed the maximum tolerated dose for Mr. Peters).

Apart from shortness of breath during exercise, he is regularly coughing with phlegm production. He gave up smoking some years ago, after 40 pack years of smoking.
His last pulmonary function test revealed a FEV1/FVC ratio of 62%, and a FEV1 of 68% of predicted. So besides HFREF, Mr Smith has also COPD, Gold Class II.

Question for decision 4: You want to prescribe a long-acting β2-agonist by inhalation (e.g. salmeterol). Does prescription of salmeterol cause you to change the prescription of metoprolol in this patient?

Response options for decision 4

1. Yes, I will increase the dosage of metoprolol to 100 mg o.d., because β2-mimetics partly block the effects of the β-blocker
2. Yes, I want to lower the β-blocker dosage to 25 mg o.d. because of the risk of bronchospasm
3. Yes, I want to lower the dosage of metoprolol to 25 mg o.d. because of the risk of bronchospasm, and furthermore increase the dosage of furosemide
4. No, I want to continue metoprolol 50mg o.d. as it is, but opt for a long-acting anticholinergic inhaler instead of a β2-agonist, because you shouldn't combine cardioselective β-blockers with β2-agonists.
5. No, I want to continue the β-blocker dosage as it is. You can combine cardioselective β-blockers with long-acting β2-agonists

Decision 4: response option #5

Information on decision 4 from Dutch CPG:

- "COPD is no contra indication for beta-blockers and also most patients with asthma tolerate (cardioselective) beta-blockers well."
- "Inhalation therapy with beta-agonists is no contra indication for HF, but because of a higher risk for dysrhythmia the dose should not be unnecessarily high [Singh 2008; Au 2003; Bouvy 2000]."