

Guideline modelling comparison paper

Documentation for PROforma models

Guideline 2 : Hypertension

Figure 1 : The component tasks of the top level plan, “Hypertension”.

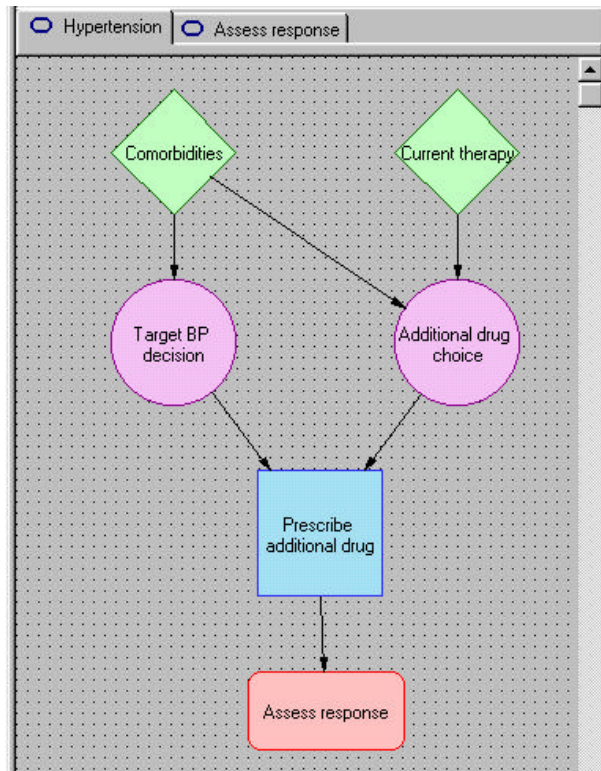
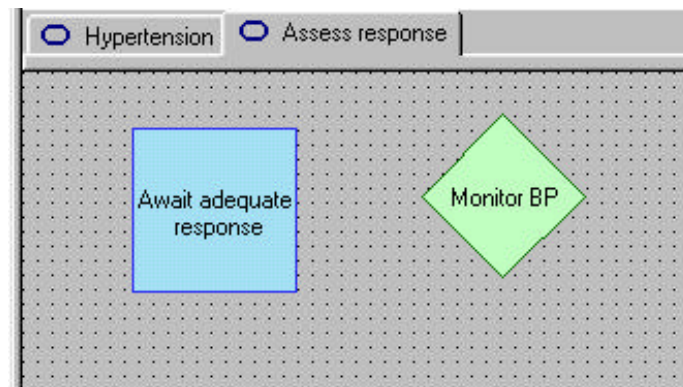


Figure 2 : The 2 tasks contained within the “Assess response” plan.



Modelling the addition of a second drug

The major requirement of this guideline is the modelling of the decision to add a second hypertensive drug.

The PROforma decision model has the following components :

- A variable number of *candidates*
- A variable number of *arguments* relating to each candidate
- A *support mode*, describing how arguments are to aggregated
- A *recommendation rule* for each candidate, describing under what circumstances that candidate is to be considered recommended
- A *choice mode*, describing whether *single* or *multiple* candidates can be simultaneously *committed to*.

(plus a few other functions not used here)

To model the decision on which second drug to add, one *candidate* has been created for each of the possible drug choices.

The decision uses the symbolic support mode; each *argument* can thus be set to ‘for’, ‘against’, ‘confirming’ or ‘excluding’ the candidate it relates to. The candidates and corresponding arguments are listed in table 1.

- Compelling indications have been given the support level “confirming”.
- Contraindications have been given the support level “excluding”.
- Relative indications and contraindications have been given the support levels “for” and “against” respectively.
- Evidence based combinations to avoid have been given the support level “excluding”
- Beneficial evidence based combinations have been given the support level “for”

Under the symbolic decision model used in PROforma, the number of arguments ‘for’ each candidate is summed, and the number arguments ‘against’ subtracted. Any arguments with a ‘confirming’ support level carry an effectively infinite amount of support for that candidate, although this is overridden if any ‘excluding’ arguments are true.

The decision task *recommends* any candidate with a net positive amount of support, and will by default select whichever candidate has the most support. The user is able to interact with the decision to review the arguments for and against each candidate and make the final selection (if the decision is set to execute ‘manually’).

Specifying Goals :

Goals are currently treated in PROforma as attributes of plans. If, whilst a plan is *'in progress'*, the logical expression described in that plan's 'goal' slot becomes true, the plan will transit to the *'performed'* state. Any tasks within the plan at that point in time will be terminated.

In this model, the plan "Assess response" has the goal :

$DBP < targetDBP$ and $SBP < targetSBP$

The plan is set to cycle continuously until that goal is met. Thus the two component tasks, the action "Await adequate response" and the enquiry "Monitor BP", are repeatedly executed until the plan's goal is met. This may not be medically or "logistically" plausible (there ought perhaps to be a time limit on the how long the one waits for a satisfactory response before trying another drug), but illustrates the way goals are currently use in PROforma.

Table 1 : The Candidates of the “Additional drug choice” decision, and their arguments.

Candidate	Argument	Support level
ACEI		
	Current_Rx = ACEI	Excluding
	Pregnancy = Yes	Excluding
	Type_1_Diabetes = Yes and Proteinuria = Yes	Confirming
	Heart_failure = Yes	Confirming
	MI = Yes and Systolic_dysfunction = Yes	Confirming
	Current_Rx = K_sparing_diuretic	Excluding
ISA_beta_blocker		
	Asthma = Yes or COPD = Yes	Excluding
	Heart_block = Yes	Excluding
	Type_1_Diabetes = Yes and Proteinuria = Yes	Against
	Current_Rx = Ca_blocker_non_DHP	Excluding
	Current_Rx = Thiazide_diuretic	For
	Current_Rx = Ca_blocker_DHP_long or Current_Rx = Ca_blocker_DHP_short	For
	Current_Rx = Beta_blocker_ISA or Current_Rx = Beta_blocker_non_ISA	Excluding
Non_ISA_beta_blocker		
	Asthma = Yes or COPD = Yes	Excluding
	Heart_block = Yes	Excluding
	MI = Yes	Confirming
	Type_1_Diabetes = Yes and Proteinuria = Yes	Against
	Current_Rx = Ca_blocker_non_DHP	Excluding
	Current_Rx = Thiazide_diuretic	For
	Current_Rx = Ca_blocker_DHP_long or Current_Rx = Ca_blocker_DHP_short	For
	Current_Rx = Beta_blocker_non_ISA or Current_Rx = Beta_blocker_ISA	For
Thiazide_diuretic		
	Isolated_Sys_hypertension = Yes and Age_group = Older	Confirming
	Current_Rx = Beta_blocker_ISA or Current_Rx = Beta_blocker_non_ISA	For
	Current_Rx = Thiazide_diuretic or Current_Rx = K_sparing_diuretic or Current_Rx = Loop_diuretic	Excluding
Loop_diuretic		
	Heart_failure = Yes	Confirming
	Isolated_Sys_hypertension = Yes and Age_group = Older	Confirming
	Current_Rx = Thiazide_diuretic or Current_Rx = K_sparing_diuretic or Current_Rx = Loop_diuretic	Excluding
K_sparing_diuretic		
	Isolated_Sys_hypertension = Yes and Age_group = Older	Confirming
	Current_Rx = ACEI	Excluding
	Current_Rx = Thiazide_diuretic or Current_Rx = K_sparing_diuretic or Current_Rx = Loop_diuretic	Excluding

Table 1 : The Candidates of the “Additional drug choice” decision, and their arguments (cont).

Candidate	Argument	Support level
Ca_channel_dihydro_short		
	Isolated_Sys_hypertension = Yes and Age_group = Older	Confirming
	Type_1_Diabetes = Yes and Proteinuria = Yes	For
	Current_Rx = Ca_blocker_non_DHP	Excluding
	Current_Rx = Beta_blocker_ISA or Current_Rx = Beta_blocker_non_ISA	For
	Current_Rx = Ca_blocker_DHP_long or Current_Rx = Ca_blocker_DHP_short or Current_Rx = Ca_blocker_non_DHP	Excluding
Ca_channel_dihydro_long		
	Isolated_Sys_hypertension = Yes and Age_group = Older	confirming
	Type_1_Diabetes = Yes and Proteinuria = Yes	For
	Current_Rx = Ca_blocker_non_DHP	Excluding
	Current_Rx = Beta_blocker_ISA or Current_Rx = Beta_blocker_non_ISA	For
	Current_Rx = Ca_blocker_DHP_long or Current_Rx = Ca_blocker_DHP_short or Current_Rx = Ca_blocker_non_DHP	Excluding
Ca_channel_non_dihydro		
	Heart_block = Yes	Excluding
	Current_Rx = Beta_blocker_ISA or Current_Rx = Beta_blocker_non_ISA	Excluding
	Current_Rx = Ca_blocker_DHP_long or Current_Rx = Ca_blocker_DHP_short	Excluding
	Type_1_Diabetes = Yes and Proteinuria = Yes	For
	Current_Rx = Ca_blocker_DHP_long or Current_Rx = Ca_blocker_DHP_short or Current_Rx = Ca_blocker_non_DHP	Excluding