

ClinicalOS – Structured decision-making in general practice

The Clinical Operating System for General Practice

Complete set: 11 volumes + 4 practical atlases

Volume 1

Decision-Making Architecture in general practice



Triple Anchor Framework · Bayesian Model · 15 chapters · Appendices A–G

"Exclude the dangerous — Treat the probable — Observe the progression"

PREVIEW - VOLUME 1

Decision-Making Architecture in General Practice

ClinicalOS

This preview contains curated extracts from the full edition.

It includes the original front matter and contents overview, together with selected pages from Chapter 1, Chapter 15 and the practical prompt appendix.

The full edition contains 203 pages; this preview contains 30 PDF pages.

The complete table of contents is shown for orientation and therefore also lists sections that are not included in this preview.

Preview marking

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The Clinical Operating System of General Practice

Volume 1: Decision-Making Architecture in General Practice

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This English edition is a translation of the original work written in German. The concept, structure, and core medical content of ClinicalOS were originally developed for German general practice and the German healthcare system, to provide practising GPs, trainee GPs, healthcare assistants (HCAs) and medical students with a structured, practice-oriented learning and reference resource. The content is based on current medical literature, guideline-based sources and practical experience in general practice.

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Chapter 2: Symptom Navigation	Taxonomy of symptom presentations, the 20 most common symptom complexes, symptom navigation algorithm, timeline analysis, clinical syndromes
Chapter 3 History-taking and Physical Examination	ICE model, SIFE model, SOCRATES framework, medication history, physical examination, vital signs, shared decision-making
Chapter 4 Red Flag Diagnostics	Absolute red flags, red flags by organ system, malignancy screening, age-specific red flags, safety netting
Chapter 5 Diagnostic Patterns and Pattern Recognition	Pattern Categories, Pathognomonic Signs, Clinical Syndromes, Top 10 Clinical Patterns, Pattern Recognition Training
Chapter 6 Diagnostic Pitfalls and Clinical Errors	Cognitive errors, systemic errors, the 10 most common diagnostic pitfalls, metacognition as a strategy for error prevention
Chapter 7 Rational Diagnosis	Bayes' principle, diagnostic cascade, overdiagnosis, clinical decision rules/scores, Choosing Wisely, diagnostic pipeline
Chapter 8 Treatment Decisions in General Practice	Shared decision-making, NNT and NNH, treatment algorithms, watchful waiting
Chapter 9 Medication Logic	Polypharmacy, STOPP criteria, START criteria, drug interactions, deprescribing
Chapter 10 Follow-up Diagnostics and Re-evaluation	Re-evaluation, follow-up assessments for chronic conditions, safety netting, longitudinal perspective (patient history)

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PART I — Fundamentals of clinical reasoning

The Clinical Operating System for General Practice

Chapter 1

Decision-Making Architecture in general practice

THEORY | The Triple Anchor System of general practice

General practice operates under three fundamental conditions:

- Low prevalence (→ high false-positive rate in tests)
- High patient density (→ time pressure; efficiency is crucial)
- Complexity arising from multiple co-morbidities (→ prioritisation and monitoring are key)

The Triple Anchor System guides every decision:

PROBABILITY — What is most likely? (Consider the most common possibilities first)

SAFETY — What must I not overlook? (Rule out red flags)

TIME — How is the clinical picture evolving? (Use progression as a tool)

Key decision-making rule:

Exclude the dangerous — Treat the probable — Observe the evolution.

1. Introduction — Why GP-related thinking is different

GP medicine differs fundamentally from specialist medicine. Whilst textbooks present diseases systematically – by organ, pathophysiology or clinical guidelines – the reality of GP practice almost always begins with a symptom.

Patients rarely present with a clearly defined diagnosis. They report pain, tiredness, shortness of breath, dizziness or fever — symptoms that can range from harmless minor ailments to life-threatening conditions.

The central challenge is therefore not to treat diseases, but to make clinical decisions in the face of uncertainty. This chapter provides the structural foundation for all subsequent chapters of the manual.

2. The three key questions in general practice

Virtually every clinical decision can be reduced to three fundamental questions:

#	Master question	Reference axis	Clinical action
1	Is it dangerous?	Safety	Actively rule out red flags
2	What is likely?	Probability	Prioritise the most common diagnosis
3	What should be done now?	Time (Progress)	Decide, treat or monitor

3. The 8-level pipeline for GP consultations

Every consultation follows a structured decision-making sequence. The 8-level pipeline makes this process explicit and easy to navigate:

Level	Stage	Key question	If positive → Action
1	Security check	Are there any red flags?	→ Follow the emergency procedure immediately
2	Clinical assessment	What do the history-taking and findings indicate?	→ Estimate the pre-test probability
3	Hypothesis-driven diagnosis	What is the most likely scenario?	→ Formulate the top three diagnoses
4	Minimal diagnostics	What does the test result change?	→ Test in a targeted manner, don't cast a wide net
5	Clinical decision	Treatment, wait or refer?	→ Establish a working diagnosis
6	Treatment/management	What is the best option?	→ Medication / Watch and wait / Referral
7	Prognostic assessment	Is the patient improving?	→ Safety net, plan follow-up
8	Re-evaluation	Is the diagnosis still correct?	→ Revise the hypothesis if necessary

💎 CLINICAL PEARL | The basic rule of the pipeline

Level 1 (safety check) MUST NEVER be skipped — even in the case of seemingly harmless symptoms.
A feedback arrow from Level 8 → Level 3 shows: diagnoses are hypotheses that are confirmed or refuted by the course of the condition.
Watchful waiting is not passive waiting — it is active diagnosis over time.

4. Safety logic — ruling out dangerous conditions takes priority

A key principle of primary care: dangerous conditions are rare — but they must not be overlooked. That is why diagnosis follows a clear safety strategy: before making any probabilistic diagnosis, check for red flags.

▶ RED FLAGS | Universal warning signs — immediate escalation

- ⚠ Chest pain with shortness of breath or profuse sweating → ACS / pulmonary embolism
- ⚠ Neurological deficit (acute) → stroke
- ⚠ Worst headache of one's life → SAH
- ⚠ $\text{SpO}_2 < 92\%$ → respiratory failure
- ⚠ Peritonism → surgical abdomen
- ⚠ Altered consciousness + fever → meningitis / sepsis
- ⚠ New-onset weight loss > 5 kg over 3 months + night sweats → malignancy
- ⚠ Any red flag → emergency pathway, no further delay in outpatient care

5. Probability-based reasoning — Horses, not zebras

General practice is a low-prevalence setting. This radically alters the significance of diagnostic tests: in practice, a positive test often has a lower positive predictive value than in a hospital — because the pre-test probability is usually low.

This gives rise to three fundamental principles of probabilistic diagnosis for GP's:

Principle	Meaning	practice rule
Horses, not zebras	Think of the common causes — not the rare ones	Fatigue → anaemia/hypothyroidism before malignancy
Bayesian reasoning	Prevalence × test result = actual probability of diagnosis	Normal TSH → Hypothyroidism almost ruled out
Parsimony	Look for a single diagnosis to explain all symptoms	Multiple symptoms? Look for the common thread

6. Temporal logic — Clinical course as a diagnostic tool

In general practice, diagnoses are often hypotheses. The course of the condition confirms or refutes them. Watchful waiting is therefore not a gap in treatment — it is an active diagnostic strategy.

Time strategy	When to use	safety net
Watchful waiting	Symptoms < 2 weeks, no red flags, typical pattern	Arrange a follow-up appointment, identify warning symptoms
Safety net	Always — for any diagnosis where there is uncertainty	“Come back if ...” — phrase this clearly
Re-evaluation	Symptom persists after 2–4 weeks with no improvement	Re-evaluate the hypothesis; do not escalate treatment
Prognostic assessment	Chronic conditions, treatment monitoring	Document follow-up data, identify trends

7. Diagnostic errors — rarely due to a lack of knowledge

Studies show that in over 75 per cent of cases, diagnostic errors are not caused by a lack of medical knowledge, but by:

Source of error	Typical mechanism	Countermeasure
Anchoring bias	The initial diagnosis is retained despite new findings	System-2 Check: Formulate 3 alternative diagnoses
Premature closure	Diagnosis made too early; search abandoned	Question: Does this explain ALL the symptoms?
Availability bias	Preference for the most recent similar diagnosis	Base rate thinking — what is common?
Lack of re-evaluation	Persistent symptoms are not reassessed	Routine re-evaluation after 2 weeks
Organisational errors	Findings not followed up, gaps in the safety net	Clear system for follow-up

💎 CLINICAL PEARL | The metacognition check

Whenever you encounter an unclear or persistent case — stop and ask yourself three questions:

1. What might I have overlooked? (Forcing function)
2. Does my diagnosis explain ALL the symptoms? (Parsimony check)
3. How might a colleague see this differently? (Change of perspective)

8. The 15 universal decision-making rules of general practice

These rules distil the decision-making logic of primary care into practical rules of thumb:

#	Decision rule	Clinical significance
1	Safety over probability	A red flag trumps any probabilistic diagnosis
2	Common diagnoses first	Common diagnoses are common — thinking in terms of ‘zebras’ is a mistake
3	Clinical course is diagnostic	How a symptom presents itself often tells us more than a test
4	Minimal diagnostics: Ask yourself first	Will the test result change what I do? If not — don’t test
5	Parsimony	A single diagnosis for multiple symptoms is more likely than multiple
6	Bayes rather than reflex	The pre-test probability determines the value of each test
7	New symptoms = ADR until proven otherwise	Any new symptom whilst on medication: rule out an ADR first
8	Question that ‘three-second judgement’	Check your first impression — it is prone to anchoring
9	A safety net is essential	Any diagnosis made under conditions of uncertainty requires a review plan
10	Take a bad gut feeling seriously	Clinical unease is often an implicit pattern signal
11	The patient is right (about their symptoms)	Never underestimate the subjective severity of symptoms
12	Multimorbidity multiplies uncertainty	More conditions = more interactions = slower diagnosis
13	Re-assess after 2 weeks	If the symptom persists: reassess the diagnosis, do not escalate
14	Referral is not a failure	Refer early if uncertainty grows — not late
15	Documentation provides certainty	Document uncertain diagnoses — for monitoring progress

9. Links to the other chapters

Chapter	Link to Chapter 1
Chapter 2 — Symptom navigation	Provides the raw material for Level 2 of the pipeline (information gathering)
Chapter 4 — Red-flag diagnostics	Operationalises the safety axis — activates Level 1
Chapter 5 — Pattern Recognition	Implements the probability axis in Level 3
Chapter 6 — Diagnostic Pitfalls	Explains why the pipeline can fail despite knowledge
Chapter 10 — Progress Diagnostics	Represents Levels 7 and 8 (Progress + Re-evaluation)
Chapter 15 — Mental Model	Translates the pipeline into 7 cognitive operations + 20 heuristics

10. Clinical use cases

Use Case 1 — Fatigue: Decision-Making Architecture in action

CASE STUDY | 52-year-old woman, 3 months of fatigue

Level 1 (Safety): No red flags (no weight loss, no night sweats, no fever)

Level 2 (Information): history-taking → work-related stress, diet, no bleeding. Normal examination findings.

Level 3 (Hypotheses): Top 3 — anaemia / hypothyroidism / burnout-related depression

Level 4 (minimal diagnostics): TSH, complete blood count, ferritin — targeted 3-parameter strategy

Level 5 (Decision): Ferritin 28 µg/l (↓), Hb normal → latent iron-deficiency anaemia

Level 6 (Treatment): Oral iron supplementation, dietary advice

Levels 7/8 (Follow-up): Review after 8 weeks — ferritin + clinical improvement

Key learning point: Minimal diagnostics (3 parameters) outperforms comprehensive diagnostics — ferritin is decisive when Hb is normal.

Use Case 2 — Dizziness: Diagnostic false start and re-evaluation

USE CASE | 67-year-old man, acute dizziness

Error: Initial hypothesis = BPLS (common). Level 1 was not carried out in full.

Overlooked: Mild dysarthria + need for walking support → red flags!

Escalation: Patient's condition worsened after 3 days → Re-evaluation (Level 8) → Admission

Diagnosis: Cerebellar infarction (MRI) — anchoring bias had caused the red flag to be overlooked

Key learning point: Level 1 (safety check) must never be skipped, even in cases with a 'typical presentation'.

Bias: Anchoring (BPLS) + Availability (the last patient with dizziness was a BPLS case)

Countermeasure: Forcing function — 'Does BPLS explain the dysarthria?' → No → Emergency diagnosis

11. Prompts for GPs — AI-assisted decision support

These prompts can be entered directly into Claude.ai, ChatGPT or another AI tool. Simply copy the text and replace [placeholder] with your own details.

PROMPT 1 | Case analysis using the 8-level pipeline

Context: Unclear case at the end of the consultation — quick, structured analysis

"I am a GP. Analyse the following case using the 8-level pipeline of the GP decision-making architecture:

[Patient case: age, gender, chief complaint, duration, accompanying symptoms]

Go through each level:

- (1) Safety check: Are there any red flags?
- (2) Key medical history: Which 3 questions are crucial?
- (3) Most likely diagnoses: Top 3 based on prevalence in general practice
- (4) Minimal diagnostics: Which 1–3 tests would change my course of action?
- (5) Clinical decision today: treatment / watch and wait / referral?

Think GP-specific (low-prevalence setting), not from a clinical inpatient perspective."

→ Expected outcome: Structured case analysis, prioritised options for action

→ Time required: ~3 minutes

PROMPT 2 | Differential diagnosis by probability

Context: Non-specific presenting symptom, several possibilities

"I am seeing a [age/gender] patient at the GP practice with [chief complaint] for [duration]. Draw up a differential diagnosis according to GP priority:

- (a) Most common diagnoses in general practice (prevalence > 5 per cent)
- (b) Serious diagnoses that I must actively rule out (red flags?)
- (c) Diagnoses that I monitor without immediate testing (watchful waiting)

Additionally: Which ONE question in the history-taking best distinguishes between the diagnoses?

Apply the principle: 'Common things are common — look for zebras only when there's a clue.'

→ Expected outcome: Prioritised differential diagnosis list, targeted history-taking clue

→ Time taken: ~2 minutes

PROMPT 3 | Red flag screening for a specific symptom

Context: New or persistent symptom — active safety check

"Red flag screening for [symptom] in a patient of [age/gender].

The patient has the following additional information: [duration, accompanying symptoms, pre-existing conditions]

List all relevant red flags in this context.

Format: Warning sign — suspected diagnosis — recommended immediate action

Then: Is there a finding here that requires immediate admission?

And: What further questions should I ask during the history-taking?"

→ Expected outcome: Structured red flag checklist, decision on admission

→ Time required: ~2 minutes

12. Clinical heuristics — Rules of thumb for everyday practice

Heuristic	Rule	When to apply
Safety versus probability	A red flag trumps any consideration of prevalence	At the start of every consultation
Horses, not zebras	Think of the common causes — rare conditions require a clue	Differential diagnosis
The course of the illness is diagnostic	How a symptom presents is often decisive for the diagnosis	Chronic symptoms
Minimal diagnostic check	"Will the test result change the course of action?" — If not: no test	Before every laboratory request
Safety-Net requirement	Every uncertain diagnosis requires an explicit follow-up plan	Before the patient is discharged

13. Further links & resources

Resource	Link	Relevance to Chapter 1
DEGAM guidelines	https://www.degam.de/leitlinien	Evidence-based decision-making
Choosing Wisely (DE)	https://www.choosing-wisely.de	Minimal Diagnostics / Prevention of Overdiagnosis
OpenEvidence	https://openevidence.com	AI-powered evidence search for differential diagnoses
MDCalc Scores	https://www.mdcalc.com	Clinical scores for decision support
Cochrane Primary Care	https://www.cochranelibrary.com	Evidence for GP interventions

⚡ ⚡ QUICK REFERENCE — CHAPTER 1: Decision-Making Architecture

1. **The 'Triple Anchor':** Probability – Safety – Time guides every decision
2. **The 3 key questions:** Is it dangerous? / Is it likely? / What should I do?
3. **8-level pipeline:** NEVER skip Level 1 (safety)
4. **Common cases first:** Horses, not zebras — zebras require a clue
5. **Clinical course is part of the diagnosis:** Watchful waiting is an active strategy
6. **Safety net:** Every uncertain diagnosis requires an explicit follow-up plan
7. **Core rule:** Rule out the dangerous — treat the probable — monitor the course

PART VI — Mental model of general practice

Chapter 15

Mental Model and Clinical Heuristics

15.1 Introduction: The mental model as a navigation system

The experienced GP does not think in terms of algorithms – he navigates. What distinguishes him from a junior doctor is not primarily a greater store of factual knowledge, but rather an elaborate mental model: an internalised map of the clinical landscape that is automatically activated when a patient enters the consultation room.

The mental model of general practice is a dynamic cognitive framework that enables simultaneous decision-making processes at multiple levels: it integrates probabilities, safety anchors, time dimensions and patient context in real time – often without conscious thought. This chapter makes this implicit knowledge explicit and shows how it can be developed through targeted training and refined through clinical heuristics.

CLINICAL THEORY: The dual-process model of clinical thinking

Clinical thinking operates on two levels, which Daniel Kahneman described as System 1 and System 2:

- System 1 (fast thinking): Intuitive, automatic, pattern-recognising. Activated in familiar situations. Resource-efficient, but prone to errors in atypical scenarios.
- System 2 (Slow Thinking): Analytical, step-by-step, conscious. Activated in situations of uncertainty, complexity or red flags. Resource-intensive, but more precise.

Clinical expertise = optimal balance between System 1 and System 2. The experienced doctor knows when to trust their gut feeling – and when to pause and analyse.

→ Heuristics are the link: they condense analytical knowledge into decision-making rules that can be accessed quickly.

System 1 vs. System 2 in a clinical context

Dimension	System 1 (Intuitive)	System 2 (Analytical)
Speed	Milliseconds to seconds	Seconds to minutes
Consciousness	Unconscious, automatic	Conscious, controlled
Triggers	Familiar patterns, routine	Uncertainty, complexity, red flags
Foundation	Experience, pattern recognition	Rule-based thinking, algorithms
Type of error	Anchoring, availability bias	Overthinking, paralysis by analysis
Strength	Efficiency, intuition	Precision, Completeness
General practitioner's role	70–80% of all consultations	In cases of red flags or complex cases

15.2 The 7 cognitive operations of the clinical mental model

The mental model of the experienced GP integrates seven cognitive operations that run in parallel and sequentially. Together, these operations form the navigation system for every clinical encounter:

#	Cognitive operation	Key question	Tool / Method
1	Pattern recognition	Do I recognise this pattern?	Illness scripts, prototypes
2	Probability estimation	What is most likely?	Prevalence, Bayes, prior probability
3	Safety filter	What must I not overlook?	Red flag checklist, safety netting
4	Time frame	Acute, subacute or chronic?	Timeline analysis, progression patterns
5	Contextualisation	Who is this patient?	ICE, SIFE, biopsychosocial model
6	Testing the hypothesis	Is my hypothesis correct?	Targeted history-taking, physical examination
7	Decision & communication	What should I do – and how do I explain it?	Shared decision-making, safety netting

In experienced practice, these seven steps take place in a matter of seconds. For those new to the profession, they are carried out sequentially and consciously; for experts, they occur in parallel and are largely automated. The aim of clinical training is the progressive automation of these steps without any loss of safety awareness.

15.3 Illness Scripts: The Building Blocks of the Mental Model

Illness scripts are cognitive schemata that store typical clinical presentations as compact patterns. They arise through repeated clinical exposure and form the basis for System 1 recognition.

💡 CLINICAL PEARL: Structure of an Illness Script

Every illness script contains three components:

- **ENABLING CONDITIONS:** Who gets this illness? (Age, gender, risk factors, context)
- **FAULT/PATHOPHYSIOLOGY:** What happens in the body? (Mechanism, not learnt by heart)
- **CONSEQUENCES:** What does the patient experience? (Symptoms, progression over time, typical findings)

Example illness script: Acute appendicitis

- **Enabling:** Young adults (10–30 years), no difference between sexes
 - **Fault:** Obstruction of the appendix → inflammation → perforation
 - **Consequences:** Begins periumbilically, migrates to the right upper quadrant (RUQ), nausea, fever, rebound tenderness
- The more illness scripts a doctor has internalised, the faster and more accurately they can recognise patterns.

15.4 Clinical heuristics: H-01 to H-14

Clinical heuristics are condensed decision-making rules distilled from experience and evidence. They serve as mental shortcuts – not as a substitute for analytical thinking, but as intelligent activation patterns for the right thought process at the right time.

No.	Heuristic	Clinical significance	Relevant chapter
H-01	Triple Anchor	Assess every decision against three axes: probability, certainty, time. No decision should be made without all three anchors.	Chapter 1
H-02	Occam's Razor	The simplest explanation is usually the correct one. Favour a single diagnosis over several – until the data contradicts it.	Chapter 5
H-03	Hickam's Dictum	Older patients may have several diagnoses at the same time. Multimorbidity is the rule, not the exception.	Chapter 10
H-04	Prevalence first	Always consider the most common diagnoses first. The most likely is the most likely.	Chapter 2, 7
H-05	Red flag before pattern	Rule out the dangerous possibilities first, before treating the likely ones.	Chapter 4
H-06	Time as a Diagnosis	The course of events is often more diagnostic than a single finding. Observe, wait, reassess.	Chapter 10

No.	Heuristic	Clinical significance	Relevant chapter
H-07	Fit the Gestalt	If findings do not fit the overall picture, question the diagnosis – even if the individual findings are correct.	Chapter 5
H-08	If the condition worsens, reconsider	Any deterioration despite adequate treatment is a diagnostic warning sign.	Chapters 4, 6
H-09	The patient explains their problem	Take the patient's perspective (ICE) seriously – it often holds the key to the diagnosis.	Chapter 3
H-10	Minimal diagnostics, maximum information	Choose the test that yields the most information. Fewer tests can mean more.	Chapter 7
H-11	Treatment as a diagnosis	If the treatment works, the diagnosis was probably correct. If not: rethink.	Chapter 8
H-12	Communication is therapy	The way in which diagnoses are explained influences the success of treatment.	Chapters 3, 11
H-13	Always provide a safety net	Every patient needs clear instructions on when to return. No consultation without an exit strategy.	Chapter 4, 10
H-14	AI as a second opinion	AI tools complement the mental model – they do not replace it. Use them for differential diagnoses and to check against guidelines.	Chapter 1, 15

15.5 The 5 universal decision-making strategies

Beyond individual heuristics, there are five overarching decision-making strategies that are universally applicable in general practice:

Strategy	Core principle	Clinical application	Pitfall
1. Probability First	Tackle the most likely scenario first	Empirical treatment for typical presentations; testing only in cases of uncertainty	Anchoring – the initial diagnosis becomes entrenched too early
2. Safety First	Rule out dangerous conditions first	Red-flag screening in every consultation; low threshold for referral	Overdiagnosis – too many safety investigations
3. Time as a Tool	Use watchful waiting strategically	Watchful waiting with a specific follow-up plan	Missed diagnosis due to lack of monitoring
4. Test of Treatment	Therapy as a diagnostic tool	Trial treatment with defined success criteria	Bias – success is attributed to the treatment, not the diagnosis
5. Shared Decision	Decision-making together with the patient	Explaining options, incorporating preferences, taking values into account	Paternalism or, conversely, overwhelming the patient

15.6 Architecture of the mental model: the clinical navigation map

The GP's complete mental model can be represented as a multidimensional navigation map that simultaneously integrates operational (What do I do now?), epistemic (What do I know?) and metacognitive levels (How do I think?):

Level	Function	Tools	Activation
Operational	What do I do now?	8-level pipeline, decision-making algorithms	At every consultation
Epistemic	What do I know about this?	Illness scripts, evidence base, guidelines	When formulating hypotheses
Probabilistic	How likely is what?	Bayes, prevalence, clinical scores	In differential diagnosis
Certainty	What must I not overlook?	Red flag checklists, safety netting	Continuous, automatic
Temporal	How is this progressing?	Management strategies, watchful waiting	In cases of uncertainty/progression
Contextual	Who is this patient?	ICE, SIFE, biopsychosocial model	Always, especially in chronic cases
Metacognitive	How am I thinking right now?	Bias detection, dual-process awareness	In the event of errors, uncertainty or complexity

15.7 Mental models in typical clinical situations

Clinical situation	Primary system	Heuristics	Reaction of the mental model
Familiar scenario (e.g. simple UTI)	System 1	H-04 Prevalence first	Direct pattern recognition → empirical treatment
Atypical presentation	System 2 activated	H-07 Assess the overall picture	Analytical review → extended diagnostics
Red flag detected	System switch S1→S2	H-05 Red flag prior to pattern	Immediate stop → systematic investigation
No diagnosis following initial consultation	System 2 + time	H-06 Time as a diagnosis	Watchful waiting with safety netting
Treatment failure	System 2 mandatory	H-08 If the condition worsens → rethink	Revise the diagnosis → differential diagnosis
Patient with multiple comorbidities	Hybrid system	H-03 Hickam's Dictum	Multiple parallel illness scripts activated

15.8 Cognitive traps and bias detection

A mental model is only as good as one's awareness of its limitations. The most common cognitive traps in general practice must be recognised and actively counteracted:

Bias	Definition	Recognition signs	Counter-strategy
Anchoring bias	Fixation on the initial diagnosis despite evidence to the contrary	Symptoms are adapted to fit the initial diagnosis, rather than the other way round	Actively seek alternative diagnoses; regularly question the diagnosis
Availability bias	Overestimation of the most recent or most dramatic diagnoses	Estimates of frequency based on the most recent experience	Consciously incorporate prevalence data; check base rates
Premature Closure	Making a diagnosis before all the data has been reviewed	Satisfaction following the first plausible diagnosis	Systematic checklists; 'What else might I have overlooked?'
Commission bias	Urge to act rather than wait and see	Unnecessary tests, referrals, treatments	Consciously using watchful waiting as a strategy
Framing effect	The influence of patient presentation on diagnosis	Diagnosis fits the patient's 'type', not the facts	Examining information out of context
Zebra Hunting	Overdiagnosis of rare conditions	Common diagnoses are ruled out; rare conditions are sought	Rule out the common first (Occam's razor); consider prevalence

METACOGNITIVE RED FLAGS — When the mental model fails

- You are very certain — without sufficient data
 - The patient confirms everything you ask (confirmation bias in both directions)
 - You think 'That can't be right because...' instead of 'What do the data show?'
 - The diagnosis fits the patient's 'type', not the findings
 - You haven't come up with any new hypotheses for several minutes
 - Your gut feeling says 'no', but all the findings are normal → Trust your gut feeling!
- Solution: Think out loud, ask colleagues, systematically go through 'What might I have overlooked?'

15.9 Clinical Use Cases



USE CASE: System 1 vs. System 2 in practice — The misinterpreted dizziness

Patient: 68-year-old woman, chronic dizziness for the past 3 weeks, known hypertension

Clinical question: Is this benign positional vertigo (System 1 recognition) or is there something more serious?

Application of mental model: System 1 activated: elderly woman, vertigo → positional vertigo pattern. However: heuristics H-08 (if worsening/persistent: reconsider) + H-05 (red flag before pattern) → switch to System 2. Systematic assessment: directional vertigo? Associated symptoms? Neurological deficits? Medication review (antihypertensives!). Findings: Nystagmus present, but also newly-onset gait ataxia.

Outcome: Referral to neurology, MRI: cerebellar infarction. Postural vertigo was plausible as a System 1 diagnosis, but red flags (progression, ataxia) should have triggered System 2 thinking earlier.

Key lesson: System 1 is valuable, but red flags must lead to an immediate switch to System 2. Persistent symptoms without improvement = automatic trigger for System 2.



USE CASE: Overcoming anchoring bias — The 'depressed' patient with physical symptoms

Patient: 52-year-old woman, with a history of depression, presents with fatigue and weight loss

Clinical question: Is this a depressive episode with somatic symptoms, or is there an independent organic condition?

Application of mental model: Initial (anchoring): 'Known depression + fatigue = depressive episode.' No further organic tests. Three weeks later: no improvement on antidepressants. Heuristics H-08 (deterioration/stagnation → reconsider diagnosis) + H-11 (treatment as diagnosis: treatment failure refutes the diagnosis). System 2 activation: full history-taking, physical examination, laboratory tests. Findings: elevated TSH, positive antibodies.

Outcome: Hashimoto's thyroiditis as a separate diagnosis. Significant improvement following levothyroxine treatment.

Key learning point: Pre-existing psychiatric diagnoses do not preclude organic diseases. Treatment failure is always a diagnostic warning sign – regardless of the patient's medical history.

15.10 Prompts for GPs — Mental model and heuristics

PROMPT FOR GPs

Context: Following an unclear consultation or in cases of diagnostic uncertainty

"I am a GP and have just seen a patient with the following presentation: [symptoms, findings, previous diagnostic investigations]. I am unsure about the diagnosis. Help me: (1) What cognitive traps might I be falling into right now? (2) Which heuristics should I apply here? (3) Which differential diagnoses might I have overlooked? (4) What would be the next systematic step?"

Expected outcome: Structured metacognition: bias analysis + differential diagnoses + next steps

Time required: ~5 minutes

PROMPT FOR GPs

Context: For training in illness scripts and pattern recognition

"Create an illness script for me on [condition] in the following format: (1) Enabling conditions: Who is affected by this condition? (2) Pathophysiology: What happens in the body? (3) Consequences: What are the symptoms, findings and progression over time? Include: typical pitfalls and atypical presentations. Level: general practice, not specialist textbook knowledge."

Expected outcome: A concise illness script for pattern recognition, relevant to general practice

Time required: ~3 minutes

PROMPT FOR GPs

Context: For regular self-reflection following complex cases

"I would like to reflect on my clinical reasoning in the following case: [case description]. Analyse: (1) Which thinking system (System 1 or 2) did I primarily use? (2) Which heuristics (H-01 to H-14) would have helped? (3) Was I correct – and why? (4) What would I do differently in the next similar case?"

Expected outcome: Structured case reflection for continuous clinical learning

Time required: ~10 minutes

15.11 The most important heuristics — Compact reference

Heuristic	Rule of thumb	When to use
H-01 Triple Anchor	P + S + T = Decision	Always, for every decision
H-02 Occam's Razor	One diagnosis is enough — until it isn't	Young patients, clear presentation
H-03 Hickam's Dictum	Elderly + complex = multiple diagnoses possible	Multimorbid, elderly patients
H-05 Red flag before pattern	Certainty over probability	Always first, automatically
H-06 Time as a diagnosis	Waiting is sometimes the best diagnostic approach	Unclear diagnosis, watchful waiting
H-08 Deterioration = Alarm	No improvement = reconsider the diagnosis	After 48–72 hours without improvement
H-11 Treatment as a test	Is it working? → Diagnosis probably correct	After empirical treatment
H-13 Safety netting always	Clear instructions for return = safety net	At the end of every consultation

Further resources

Resource	URL / Source	Content
Kahneman: Thinking, Fast and Slow	Book (2011), Farrar, Straus and Giroux	A seminal work on dual-process theory
Groopman: How Doctors Think	Book (2007), Houghton Mifflin	Narrative analysis of clinical errors in reasoning
DEGAM guidelines (overarching)	https://www.degam.de/leitlinien	Evidence-based guidelines for general practice
BMJ Best Practice — Clinical Reasoning	https://bestpractice.bmj.com	Case-based clinical reasoning
Choosing Wisely	https://www.choosingwisely.org	Evidence-based reduction of unnecessary diagnostics
Isabel DDx Generator	https://www.isabelhealthcare.com	AI-assisted differential diagnoses

Quick Reference — Chapter 15



QUICK REFERENCE: Mental Model and Clinical Heuristics

1. The dual thinking system:

- System 1 = Fast, intuitive, pattern-based → 70–80% of consultations
- System 2 = Analytical, slow → In cases of red flags, complexity or uncertainty
- Expertise = Knowing when to use which system

2. The 7 cognitive operations (parallel, not sequential):

Pattern recognition → Probability → Safety filter → Time framing →

Contextualisation → Hypothesis testing → Decision & communication

3. Core heuristics:

- H-01 Triple Anchor: P + S + T for every decision
- H-05 Red Flag before Pattern: Safety before probability
- H-08 Deterioration = Reset: Reconsider the diagnosis if there is no improvement
- H-13 Safety Netting: Always have clear instructions for reverting

4. Cognitive traps — the 3 most common:

- Anchoring: The initial diagnosis becomes entrenched too early
- Premature closure: Stopping the search for hypotheses after the first plausible diagnosis
- Availability bias: Overestimation of the most recent information

5. Basic metacognitive rule:

'If something doesn't fit – pause. If your gut feeling warns you – listen.'

Cross-References

→ Chapter 1 (Triple Anchor Framework) — → Chapter 4 (Red-Flag Diagnostics) — → Chapter 5 (Pattern Recognition) — → Chapter 6 (Cognitive Errors) — → Chapter 7 (Rational Diagnosis) — → Chapter 10 (Prognostic Diagnosis)

Appendix F — Prompt collection guide for clinical practice

All copyable doctor prompts from the manual — collected and categorised for direct use with AI assistants (Claude, ChatGPT, Gemini, etc.).

Category: Diagnostics & Differential Diagnosis

🗨️ Generate a differential diagnosis

Patient, [age] years, [gender]. Main complaint: [symptom], duration: [time]. Relevant pre-existing conditions: [List]. Create a prioritised differential diagnosis listing the 5 most likely diagnoses, ranked by probability. For each, state: (1) pre-test probability, (2) key findings, (3) exclusion criteria. GP perspective, in German.

🗨️ Triple Anchor Analysis

Analyse this case using the Triple Anchor model: Anchor 1 (Probability): Most likely diagnoses? Anchor 2 (Safety): Which red flags must be ruled out? Anchor 3 (Time): How should one proceed in terms of time course and follow-up? Case: [brief case description]

🗨️ Red Flag Screening

The patient presents with [main complaint]. Systematically list all clinically relevant red flags for this symptom by organ system. Highlight those that require immediate investigation. Format: table. GP perspective, German.

🗨️ Generate illness script

Create a complete illness script for the diagnosis [Diagnosis]. Structure: epidemiology, pathophysiology, time course, typical symptoms, diagnostic pathways, key differential diagnoses. Format: structured table.

🗨️ Calculate Bayes' update

Pre-test probability for [Diagnosis]: [X] %. Test performed: [Test name], sensitivity [%], specificity [%]. Calculate LR+, LR- and post-test probability for positive and negative results. Clinical implications?

Category: Treatment & Evidence

💬 Treatment options with evidence

I treat [diagnosis] in [patient profile]. List evidence-based treatment options with: (1) NNT, (2) NNH, (3) ARR, (4) GRADE recommendation, (5) key contraindications. Prioritised by strength of evidence. Sources: current German guidelines (DEGAM/AWMF/NVL) and Cochrane.

💬 Guideline search

What do current German guidelines (DEGAM, AWMF, NVL) recommend for the treatment of [diagnosis] in [patient profile]? State the GRADE recommendation level. Date: [year].

💬 Preparing for shared decision-making

Prepare a shared decision-making consultation for: diagnosis [diagnosis], choice between Option A ([treatment A]) and Option B ([treatment B]). For each option, state: benefit (NNT), harm (NNH) and patient preference factors. Formulate three open-ended questions for the consultation with the patient.

Category: Medication & polypharmacy

💬 STOPP/START Medication Review

Patient, [Age] years, GFR: [Value] ml/min. Medication list: [List]. Systematically review using STOPP/START v3: (1) Which medications should be discontinued and why? (2) Which medications should be adjusted? (3) Which medications should be newly initiated? Prioritise according to clinical urgency.

💬 Interaction check

Check for potential clinically relevant interactions between the following medicines: [List]. Focus on: QT prolongation, risk of bleeding, CYP interactions, electrolyte disturbances. Only clinically relevant interactions (Caution level).

💬 8-level pipeline for a single medication

Systematically assess [medication] for [patient, age, diagnosis]: (1) Is the indication clear? (2) GRADE evidence? (3) Is dose adjustment required (GFR [value])? (4) Relevant interactions? (5) Contraindications? (6) Likely adherence issues? (7) Duration of treatment defined? (8) Review date?

Category: Progress & Quality

💬 Formulate a safety net

Formulate a specific safety net for a patient with [diagnosis / unclear situation]. Structure: Green (wait and see), Yellow (contact us), Red (act immediately). List specific symptoms for each category. Define timeframes. Use patient-friendly language.

CIRS Case Analysis

Analyse this near-miss / critical incident for our CIRS report: [case description]. Structure as follows: (1) What happened? (2) Why did it happen (root cause)? (3) What could have prevented it? (4) System change recommended? No blame, constructive.

Evaluate quality indicator

I have the following practice data: [Indicator, current value, target value]. Analyse: (1) Gap to target achievement, (2) most likely causes, (3) 3 specific measures for improvement. Source: DEGAM quality indicators.

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