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SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

Flexible Intelligence: A What-If Journey Through Medical Treatment, Insurance & Rehabilitation

Insights from Future of Innovation Lab x Lee Kuan Yew Centre for Innovative Cities

BIG TOPIC:

What if AI had been part of a rare disease journey—across medical treatment, insurance, and rehabilitation? Could it have connected the dots faster, clarified options, and reduced stress?

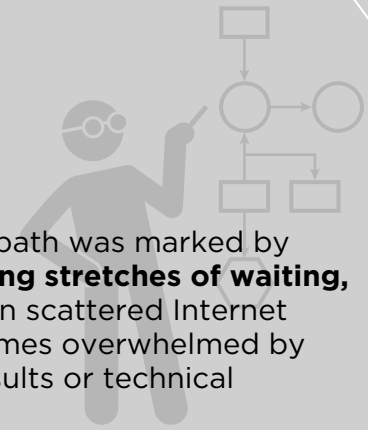
NEED

Patients facing serious illnesses often deal with fragmented care, piles of reports, and confusing insurance processes. Lacking clear guidance, stress grows during treatment and recovery—made worse by financial worries. Though AI tools can help, many patients remain wary, questioning their accuracy, safety, and reliability. The key question remains: can AI truly complement human judgment with clarity, compassion, and confidence?

OPPORTUNITY

By working and learning with super creative and experienced professionals, we can discover a deeper understanding of where AI is a tool, teammate and neither. In this Explainer, we show how in the domain of Fitness. We do so via a reconstructed conversation between a researcher and a highly accomplished fitness instructor of their experiments and discussions over a year.

Medical Treatment: From Fragments to System Thinking



RS[1]'s health journey began not with one dramatic event, but with fragments: headaches, difficulty walking, high platelets, protein in urine and abnormal electrolyte levels such as low sodium. Each symptom was managed in isolation by a different specialist including a endocrinologist, nephrologist, neurologist—yet no one had the full picture.

The siloed approach prolonged uncertainty until advanced tests including a special protein blood test, biopsies, and PET-CT scan finally revealed the condition of a rare blood disorder called POEMS Syndrome.

[1] RS is the interviewee's pseudonym

Without AI, this path was marked by **confusion and long stretches of waiting,** with RS relying on scattered Internet searches, sometimes overwhelmed by contradictory results or technical explanations.

With AI, the experience might have been different. Test reports could be uploaded into ChatGPT and explained in plain language. **Symptoms could be clustered, hinting at systemic links** rather than isolated problems. While only doctors can diagnose, AI could have functioned as an early **system thinker**—suggesting questions to ask specialists, surfacing patterns and perhaps pointing to rare disease patterns sooner.

CLINICAL LABORATORY

SPECIAL PROTEIN STUDIES — Collection Date: 19 July, 2024 Time: 10:05:00 AM

	RESULT		REFERENCE		UNITS	RESULT
Serum Kappa FLC	16.60	(	6.70 -	22.40	mg/L)	
Serum Lambda FLC	150.00 H	(	8.30 -	27.00	mg/L)	
Serum Kappa/Lambda Ratio	0.11 L	(	0.31 -	1.56	)	

HAEMATOLOGY — Collection Date: 19 July, 2024 Time: 10:05:00 AM

		RESULT		REFERENCE		UNITS	RESULT
RBC	红细胞计数	4.95	(	4.01 -	5.36	mil/uL)	
HGB	血红蛋白	15.2	(	13.0 -	16.9	g/dL)	
HCT	红细胞比积	46.6	(	35.6 -	50.6	%)	
MCV	红细胞平均体积	94.1	(	79.1 -	97.4	fL)	
MCH	红细胞平均血红蛋白	30.7	(	25.5 -	33.1	pg)	
MCHC	红细胞均血红蛋白浓度	32.7	(	30.9 -	34.8	g/dL)	
RDW	红细胞体积分布宽度	15.0	(	12.2 -	15.4	%)	
MPV	血小板平均体积	8.0	(	6.8 -	10.4	fL)	
PLT	血小板计数	406	(	140 -	460	ths/uL)	
WBC	白细胞计数	7.58	(	4.20 -	11.00	ths/uL)	
Neutrophils	中性粒细胞	77.5 H	(	42.5 -	74.0	%)	
Lymphocytes	淋巴细胞	12.5 L	(	21.1 -	43.2	%)	
Monocytes	单核细胞	2.8 L	(	4.0 -	10.0	%)	
Eosinophils	嗜酸性粒细胞	6.0 H	(	0.0 -	5.6	%)	
Basophils	嗜碱性粒细胞	1.2 H	(	0.0 -	1.0	%)	
Neutrophils #		5.87	(	1.90 -	7.20	ths/uL)	
Lymphocytes #		0.95 L	(	1.20 -	3.40	ths/uL)	
Monocytes #		0.21	(	0.20 -	0.70	ths/uL)	
Eosinophils #		0.45	(	0.04 -	0.56	ths/uL)	
Basophils #		0.09	(	0.00 -	0.09	ths/uL)	

Looking at this report on its own, without knowing your history, here's what it shows and could suggest to a clinician:

Special Protein Studies

- **Serum Kappa FLC**: Normal (16.6, ref 6.7–22.4)
- **Serum Lambda FLC**: **Markedly elevated** (150, ref 8.3–27.0)
- **Kappa/Lambda Ratio**: **Very low** (0.11, ref 0.31–1.56)

💡 **Interpretation**:
There is **monoclonal excess of lambda free light chains**. This kind of abnormality often raises concern for **plasma cell or lymphoid disorders** (e.g. multiple myeloma, AL amyloidosis, MGUS, or related conditions). The ratio imbalance is the key red flag here.

Haematology

- **Red cell parameters (RBC, Hb, HCT, MCV, MCH, MCHC, RDW)**: All within normal range → **no anemia**.
- **Platelets (406, ref 140–460)**: Normal.
- **Total WBC (7.58, ref 4.20–11.00)**: Normal overall count.

Differential white cells:

- **Neutrophils**: Slightly high (77.5% vs 42.5–74.0).
- **Lymphocytes**: Low (12.5% and absolute 0.95 vs 1.20–3.40).
- **Monocytes**: Low (2.8% vs 4–10).
- **Eosinophils**: Mildly elevated (6.0% vs 0–5.6).
- **Basophils**: Upper end of normal (1.2%).

💡 **Interpretation**:
The white cell distribution shows a **relative neutrophilia** and **lymphopenia**, with mild **eosinophilia**. This can reflect:

- recent infection, inflammation, or stress,
- effect of medications (e.g. steroids),
- immune system imbalance.

Overall Picture (without prior knowledge)

1. **Strong abnormality in protein studies** → suggests an **underlying plasma cell disorder** producing excess lambda light chains. This is the most significant finding.
2. **Stable red cells and platelets** → no evidence of anemia or marrow suppression at present.
3. **White cell shifts** (neutrophil up, lymphocytes down, eosinophils up) → could point to **immune dysregulation, stress, or treatment effect**.

✅ If a doctor were reviewing this in isolation, they would likely:

- Flag the **lambda light chain overproduction** as the key abnormality.
- Consider ruling out **plasma cell disorders** with further work-up (e.g. bone marrow studies, imaging, SPEP/UPEP, immunofixation).
- Note that blood counts are otherwise preserved, which is reassuring.

Would you like me to now reframe this in **simple, patient-friendly language** (like how a doctor might explain it in clinic)?

"AI could have been a second set of eyes, connecting the dots sooner."

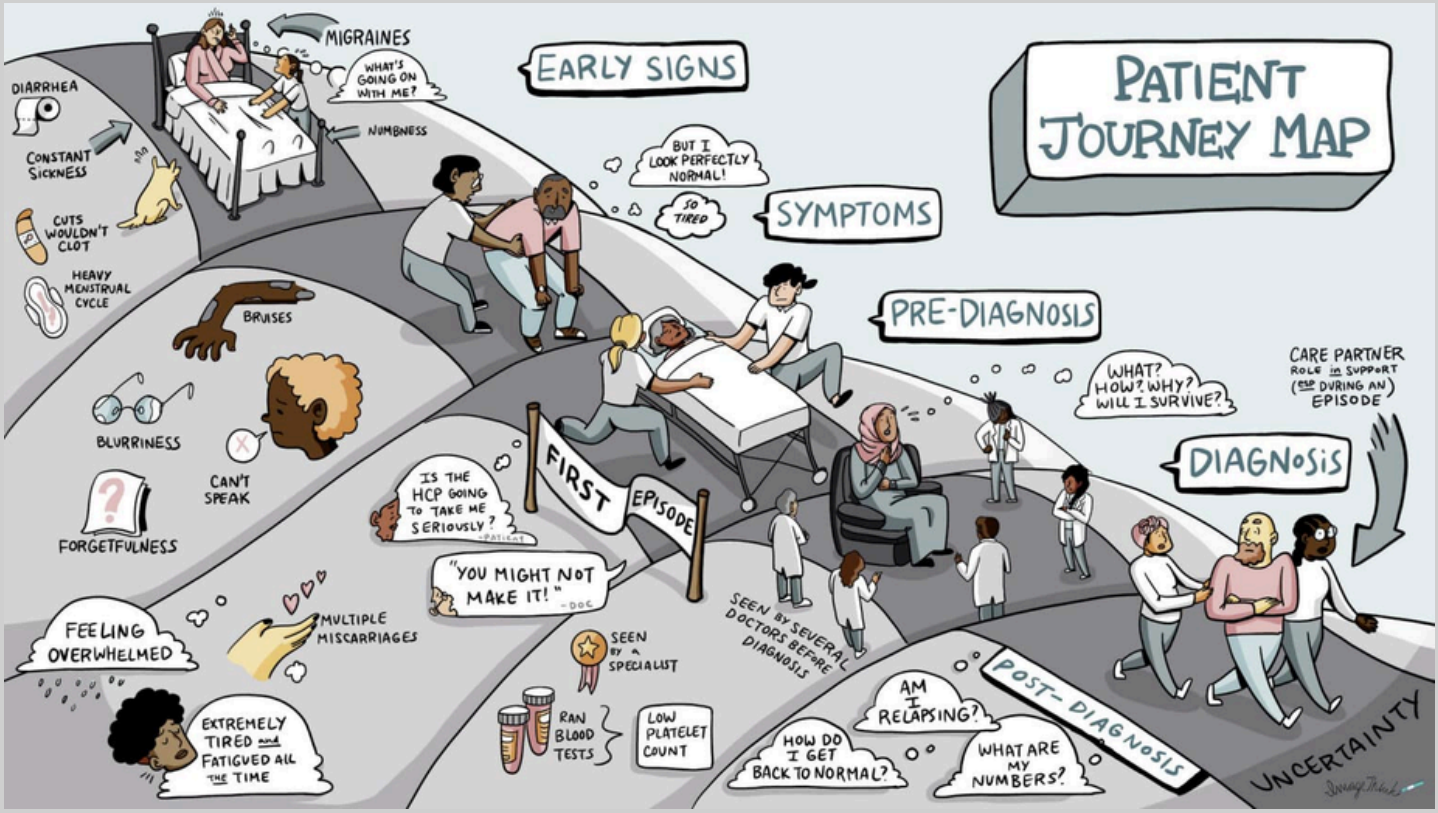
Insurance: From 40 Pages to Clear Answers

Medical diagnosis and treatment was only the first hurdle. Insurance became another. Policy documents ran 30–40 pages, filled with exclusions, coverage limits, and dense legal language. Confusion over what was covered added yet another layer of stress, forcing RS to balance healing his body with negotiating bureaucracy.

Without AI, the process was **exhausting.** Each clause had to be parsed manually, often with **uncertainty** about what the real world implications were. Clarity, when it came, was **slow and incomplete.**

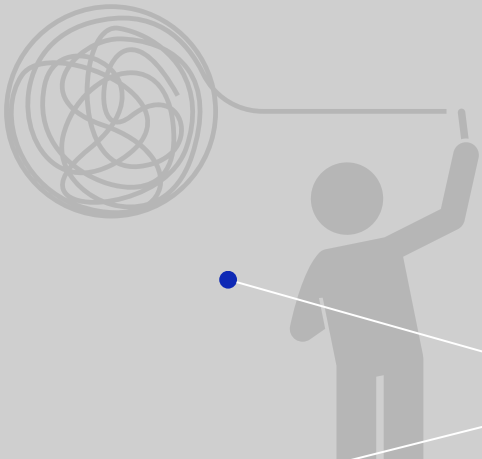
With AI, RS later discovered a different path. He could upload the entire policy into ChatGPT and ask: “Is this medical treatment covered?” or “What does this exclusion mean?”. The search for answers that once dragged on for weeks of ambiguity was reduced to minutes of clarity.

Had AI been used earlier, it might have transformed legalistic jargon into everyday language, strengthened appeals and given RS the confidence to focus on recovery rather than red tape.



https://www.imagethink.net/from-diagnosis-to-treatment-the-benefits-of-patient-journey-mapping/

“Instead of weeks of ambiguity, answers could have come in hours.”



Rehabilitation: From Isolation to Guided Recovery

The recovery process after treatment was slow, prolonged, and emotionally taxing. The medical system focused on procedures and milestones, but not on the day-to-day challenges of recovery. RS sometimes felt isolated—uncertain whether side effects were normal, whether exercises were correct, or whether setbacks signalled dangerous.

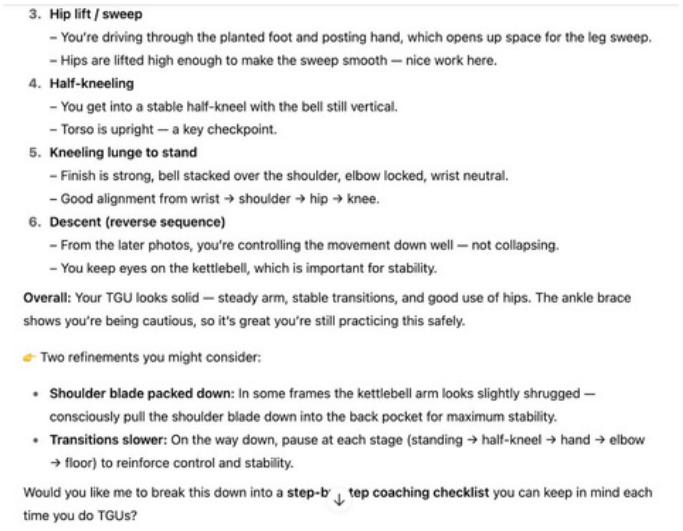
Without AI, recovery meant late night searches, endless scrolling of medical forums and lingering doubts. The **stress** only deepened his **physical exhaustion.**

With AI, which he began using only after treatment, recovery took on a new dimension. ChatGPT became both an explainer and constant companion—**clarifying side effects, offering suggestions for nutrition and exercise, and answering questions without judgment.**

One striking example came from RS's kettlebell exercises. Wanting to rebuild strength and mobility safely, RS filmed his sessions and uploaded images into ChatGPT. By uploading pictures of his movements into ChatGPT, he received feedback on form and alignment. The AI flagged posture issues and suggested adjustments, helping him refine his technique and reduce the risk of injury. Over time, these **AI-guided corrections** reduced the risk of injury, accelerated his progress and gave him greater confidence in his recovery.

AI did not replace the reassurance of doctors or family, but it lightened the mental load. Rehabilitation became less about navigating uncertainty alone, and more about feeling supported by a **24/7 guide**—both informational and practical.

"AI didn't replace doctors, but it lightened the load and reduced the loneliness."



3. **Hip lift / sweep**
   - You're driving through the planted foot and posting hand, which opens up space for the leg sweep.
   - Hips are lifted high enough to make the sweep smooth — nice work here.
4. **Half-kneeling**
   - You get into a stable half-kneel with the bell still vertical.
   - Torso is upright — a key checkpoint.
5. **Kneeling lunge to stand**
   - Finish is strong, bell stacked over the shoulder, elbow locked, wrist neutral.
   - Good alignment from wrist → shoulder → hip → knee.
6. **Descent (reverse sequence)**
   - From the later photos, you're controlling the movement down well — not collapsing.
   - You keep eyes on the kettlebell, which is important for stability.

Overall: Your TGU looks solid — steady arm, stable transitions, and good use of hips. The ankle brace shows you're being cautious, so it's great you're still practicing this safely.

👉 Two refinements you might consider:

- **Shoulder blade packed down:** In some frames the kettlebell arm looks slightly shrugged — consciously pull the shoulder blade down into the back pocket for maximum stability.
- **Transitions slower:** On the way down, pause at each stage (standing → half-kneel → hand → elbow → floor) to reinforce control and stability.

Would you like me to break this down into a **step-b↓tep coaching checklist** you can keep in mind each time you do TGUs?

The Big Differences With and Without AI

When asked about the contrast, RS put it simply:

- **Stress:**
  - Without AI: Journey was filled with anxiety, endless Googling, and unanswered questions.
  - With AI: Quick, clear explanations that reduced stress.
- **Information:**
  - Without AI: Struggled to interpret test results and policy terms.
  - With AI: Information was at his fingertips—structured, simplified, and searchable.
- **Timing:**
  - Without AI: Diagnosis and decisions were slowed by fragmented expertise.
  - With AI: Connections between symptoms, coverage rules, and rehabilitation practices might have emerged earlier, accelerating action.
- **Agency:**
  - Without AI: Felt reactive, always one step behind.
  - With AI: More proactive—asking sharper questions, negotiating from a stronger position, and managing his recovery with clarity.

As RS reflected: “If I had used ChatGPT earlier, I would have understood both my treatment and where I stood in the journey far more clearly.”

“If I had used ChatGPT earlier, I would have understood my treatment and where I stood in the journey far more clearly”

Checking Accuracy: The Human Filter Still Matters

While AI can simplify complex reports, decode insurance policies, and offer recovery guidance, its suggestions are not always correct. RS himself found that sometimes ChatGPT gave overly generic or even misleading cues.

That is why **human expertise remains essential**. Doctors, insurers, and experienced caregivers provide the judgment needed to filter AI outputs, correct mistakes, and ensure safety. **AI should never replace medical advice, but if used well, it can speed up access to information while humans safeguard accuracy.**

Key point for readers: The power of AI lies not in blind trust, but in its partnership with human judgment.

Reflection: Walking Together

The “what-if” lens reframes RS’s journey. AI could not have cured POEMS Syndrome, nor replaced the doctors and nurses who treated RS. But it could have played a critical role as translator, connector, and companion.

- Translating dense medical and insurance language into clarity.
- Connecting fragmented symptoms into systemic insights.
- Offering steady, patient companionship during long recovery nights.

The lesson is not about rewriting the past, but about re-imagining the future of care. Medical treatment, insurance, and rehabilitation will always demand human judgment, empathy, and presence. Yet AI can stand alongside, reducing stress and enhancing understanding

The future of care is not **AI or human, but AI with human.** Together, they can turn even the hardest journeys into ones marked by **greater clarity, confidence, and hope.**