

AI for R2R Research



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Disclaimer

- Some images and examples in this presentation were generated using AI
- No real patient data were used in these examples
- All datasets presented are synthetic



OUTLINE



Why is Research
Hard?



How Can AI Help?



From Data
to Insight



Managing Papers &
Literature Review



Study Design &
Analysis



Writing &
Publication



Why Research is HARD?



คิดคำถามงานวิจัยไม่ออก

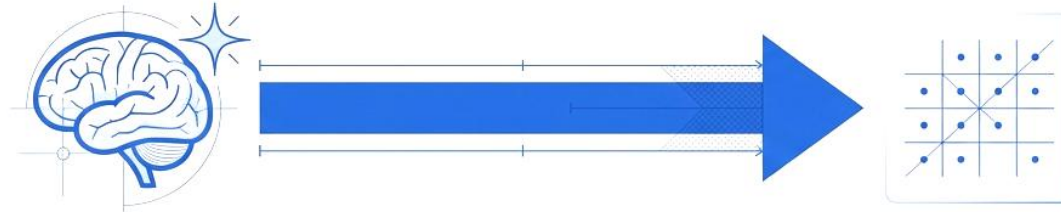
อ่าน paper ไม่เข้าใจ/ ใช้
เวลานาน

Study designs/
method/ statistics???

Mentors


Pathways to RESEARCH

Hypothesis-Led




Clinical Research Question → Literature Review → Study Design → Collect data and Analyze → Writing → Publish

I HAVE NO IDEA!!
Too broad/ too narrow
Not feasible



Too MUCH DATA



Funding/Resources

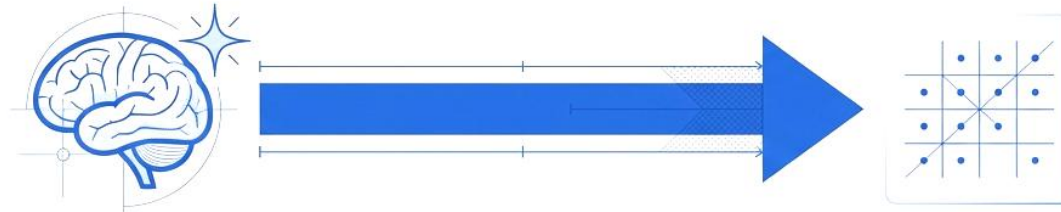


EXPERTISE:
Statistics, writing,
mentors/consultant



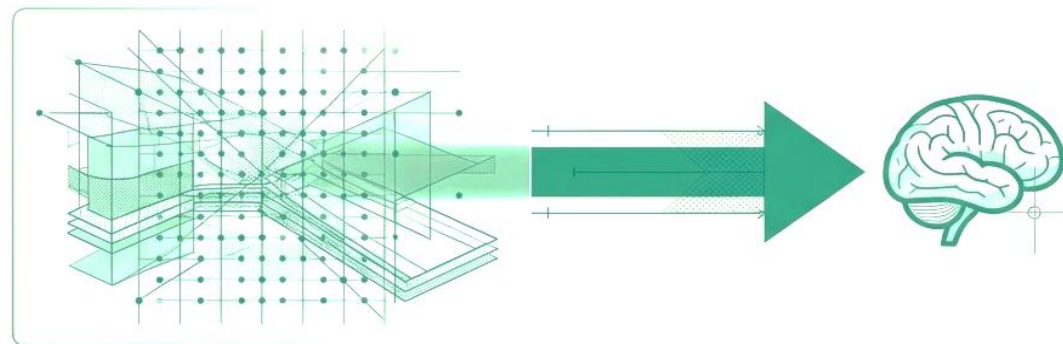
Pathways to RESEARCH

Hypothesis-Led



Clinical Research Question → Literature Review → Study Design → Collect data and Analyze → Writing → Publish

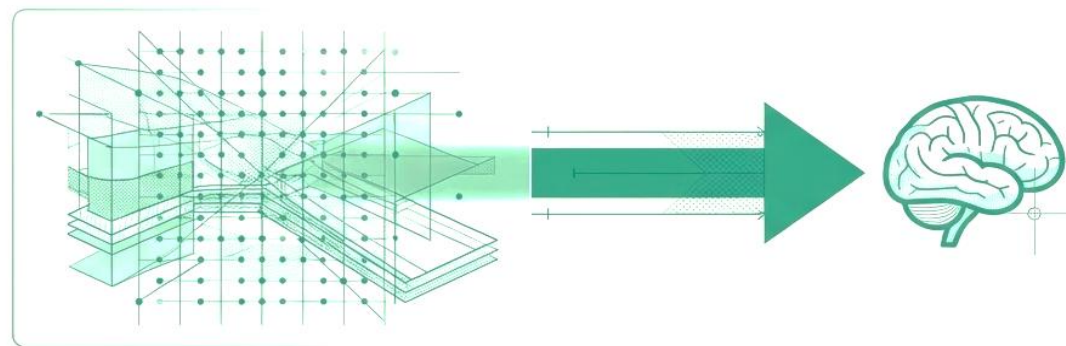
Data-Led



Existing routine data → Refined question from DATA → Data management and Analysis → Writing → Implement

Pathways to RESEARCH

Data-Led



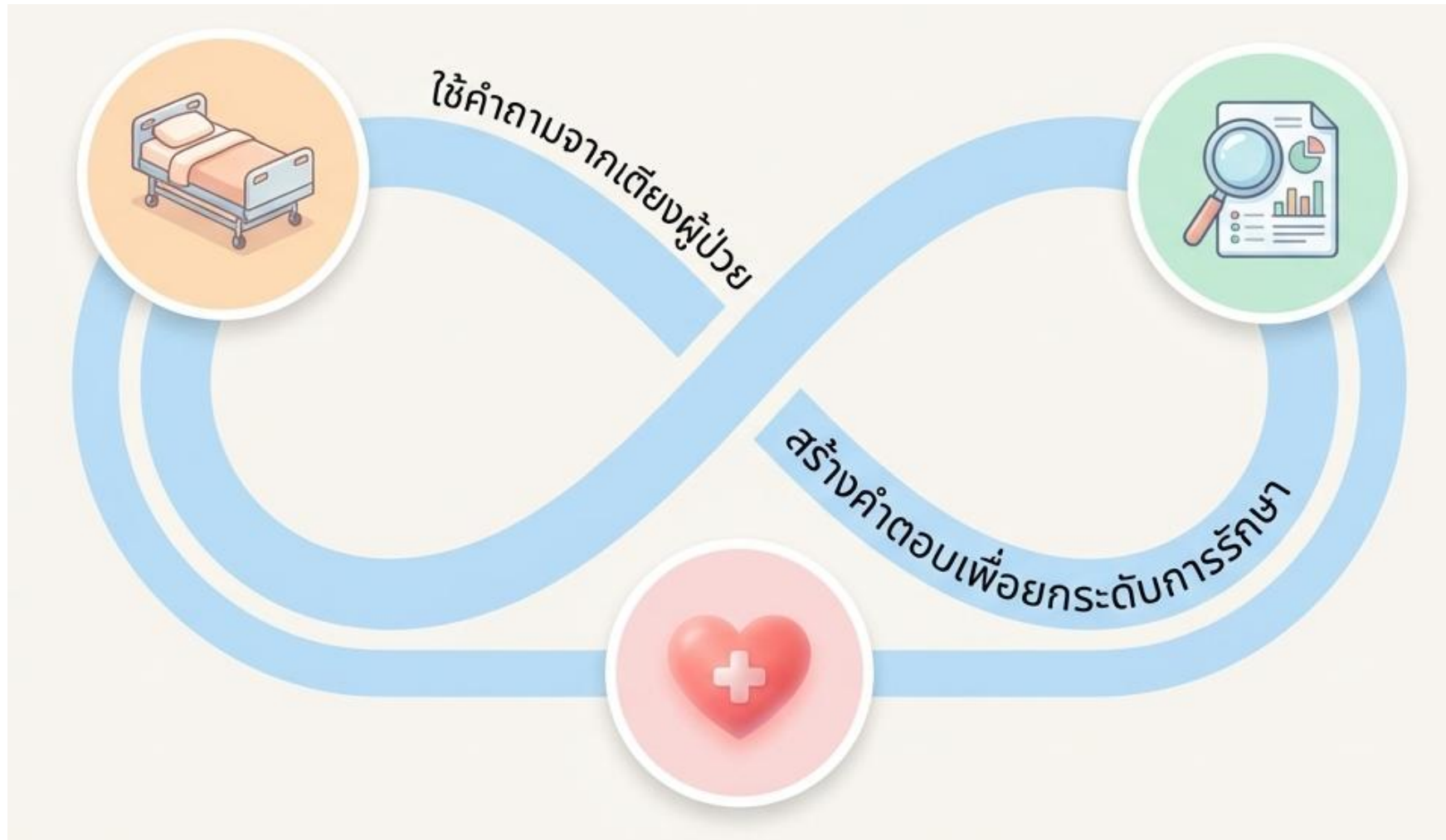
Existing routine data → Refined question from DATA → Data management and Analysis → Writing → Implement

Messy DATA

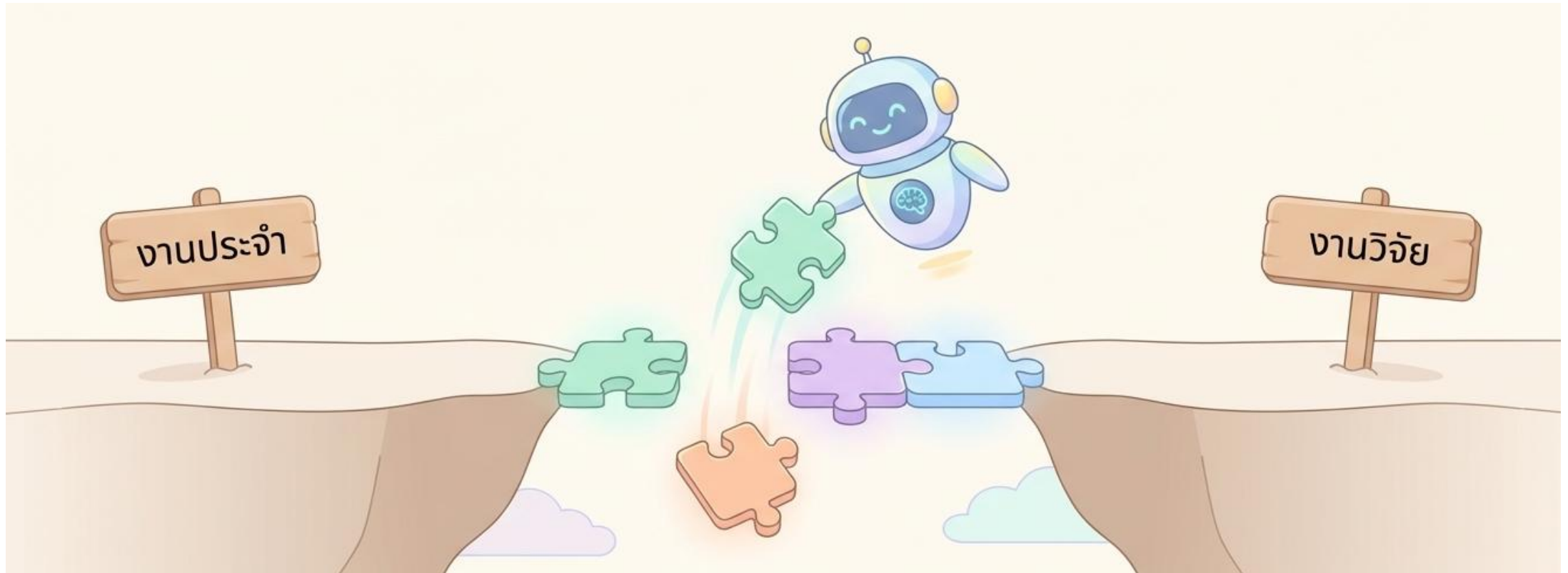
Data interpretation
Translate DATA to clinical
question

Data management skills
Statistics, writing, mentors/consultant

Routine to RESEARCH



How can AI HELP?



How can AI HELP?

HANDLE MASSIVE DATA




Processes billions of routine points efficiently.

DATA PROCESSING -- FASTER, MORE ACCURATE



Automates cleaning & structuring; Reduces human error

ACCELERATES DATA EXPLORATION AND IDENTIFY NON-OBVIOUS PATTERNS



HIDDEN PATTERN FOUND
Finds correlations humans might miss.

BRAINSTORMING AND FEEDBACK



Generates research questions; provides initial peer-review.

Can we predict fall risk using nursing notes?

Is there a trend in these critical lab results?

So Many AI Tools—Where Do We Start?



ChatGPT



Gemini



Claude



SCISPACE



perplexity



Consensus



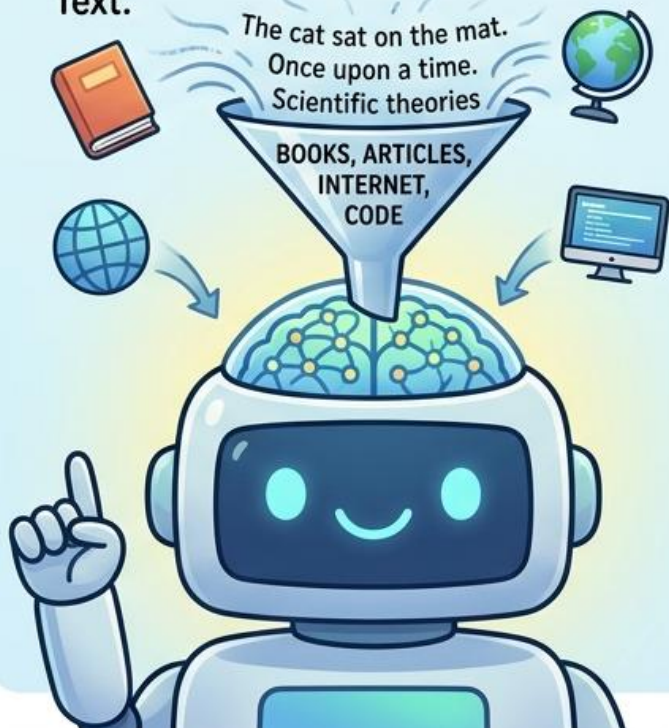
Jenni



Large Language Model (LLM)

STEP 1: LEARNING FROM EVERYTHING (The "Brain")

1. Reads tons of Books, Websites, and Text.



STEP 2: FINDING PATTERNS (The process)

2. Remembers how words usually fit together.



STEP 3: PREDICTING THE NEXT WORD (The "Output")

3. Guesses the best next word in a sentence.



WHAT AN LLM DOES:



CHATBOTS
Talks to you
(like ChatGPT).



SUMMARIZING
Makes long
stories short.



WRITING ASSISTANT
Drafts emails &
stories.



TRANSLATING
Changes
languages.

It doesn't truly "know" things, but it's really good at following patterns!



What we should know before using AI in research

AI sounds like it understands, but it predicts, not thinks

They capture context and relationships very well

Talk to AI like a human....*use it like research partner*



What we should know before using AI in research

Do NOT upload identifiable patient data to public AI

ชื่อ-นามสกุล

Hospital number, ID

ที่อยู่, เบอร์โทรศัพท์

วัน/เดือน/ปี เกิด

ชื่อโรงพยาบาล วอร์ด

ข้อมูลที่สามารถระบุตัวตนกลับได้ (**Re-identifiable data**)

Exact dates → use relative time

Rare conditions

Unique combinations



OUTLINE



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FROM DATA TO INSIGHT: DATASET 1

Date	No_of_patient_in_ward	Patient_ID	Age	Comorbidity_score	Length_of_stay	Ventilation	Mobility_Status	Urinary_Catheter	Date_urinary_catheter_insertion	History_Aspiration	Sedative_Use	Pain_Score	Room_Type	Event	Event_time	Nurse_number	Diagnosis
1/3/2026	21	P41	91	2	16	No	Assisted	Yes	1/3/2026	No	No	9	Single	None	Night		5 Cholangitis
1/3/2026	21	P43	77	5	26	No	Independent	Yes	1/3/2026	No	Yes	7	Shared	None	Day		5 Sepsis
1/3/2026	21	P03	82	8	24	No	Assisted	Yes	1/3/2026	No	No	6	Single	None	Night		5 CHF
1/3/2026	21	P50	61	7	14	Yes	Independent	Yes	1/3/2026	No	Yes	7	Shared	None	Evening		5 Pneumonia
1/3/2026	21	P52	82	7	29	No	Assisted	No		No	No	0	Single	Fall	Day		5 UTI
1/3/2026	21	P27	83	2	13	No	Dependent	Yes	1/3/2026	No	No	2	Single	None	Day		5 GI bleed
1/3/2026	21	P35	67	4	23	No	Assisted	Yes	1/3/2026	No	No	5	Single	None	Evening		5 Pneumonia
1/3/2026	21	P37	89	0	26	No	Assisted	No		No	No	6	Shared	None	Day		5 AKI
1/3/2026	21	P42	57	5	6	No	Independent	No		Yes	Yes	1	Shared	None	Day		5 GI bleed
1/3/2026	21	P40	66	3	21	No	Dependent	No		No	No	3	Shared	Fall	Night		5 CHF
1/3/2026	21	P25	82	7	19	No	Dependent	No		Yes	Yes	0	Single	None	Night		5 Cholangitis
1/3/2026	21	P55	94	3	25	No	Independent	No		No	Yes	3	Shared	None	Night		5 Cholangitis
1/3/2026	21	P47	84	4	5	No	Independent	No		No	No	7	Shared	None	Evening		5 Cholangitis
1/3/2026	21	P04	60	2	25	Yes	Assisted	Yes	1/3/2026	No	No	1	Shared	None	Day		5 GI bleed
1/3/2026	21	P28	60	6	26	Yes	Independent	Yes	1/3/2026	No	No	6	Single	None	Day		5 AKI
1/3/2026	21	P60	78	3	16	No	Independent	No		No	No	3	Single	None	Night		5 GI bleed
1/3/2026	21	P22	64	9	22	No	Dependent	No		No	Yes	5	Single	Discharge	Day		5 CHF
1/3/2026	21	P11	76	7	24	Yes	Independent	Yes	1/3/2026	No	Yes	5	Single	None	Night		5 Pneumonia
1/3/2026	21	P54	75	1	19	No	Independent	Yes	1/3/2026	No	No	0	Single	Arrest	Night		5 CHF
1/3/2026	21	P20	69	0	7	No	Dependent	Yes	1/3/2026	No	No	5	Shared	Medication	Day		5 Stroke
1/3/2026	21	P34	62	2	11	Yes	Independent	Yes	1/3/2026	Yes	Yes	4	Shared	Discharge	Evening		5 Sepsis
2/3/2026	21	P55	80	9	19	No	Assisted	No		No	No	8	Single	None	Day		9 GI bleed
2/3/2026	21	P08	78	0	8	Yes	Dependent	Yes	2/3/2026	No	No	5	Shared	None	Night		9 GI bleed
2/3/2026	21	P60	64	7	27	Yes	Dependent	No		No	Yes	9	Shared	Medication	Day		9 GI bleed
2/3/2026	21	P51	54	3	27	No	Independent	No		No	Yes	4	Single	None	Night		9 GI bleed
2/3/2026	21	P43	66	0	29	No	Independent	Yes	2/3/2026	No	No	3	Shared	None	Day		9 AKI
2/3/2026	21	P45	92	2	7	Yes	Independent	Yes	2/3/2026	No	No	6	Shared	None	Day		9 Stroke
2/3/2026	21	P25	64	5	10	No	Assisted	Yes	2/3/2026	No	No	3	Shared	None	Evening		9 Cholangitis
2/3/2026	21	P13	78	5	1	No	Dependent	Yes	2/3/2026	No	No	4	Single	Aspiration	Evening		9 Sepsis
2/3/2026	21	P24	89	6	24	No	Independent	No		No	No	7	Single	None	Day		9 CHF
2/3/2026	21	P49	82	6	6	No	Assisted	Yes	2/3/2026	No	No	6	Single	None	Evening		9 Sepsis
2/3/2026	21	P31	81	1	3	No	Assisted	Yes	2/3/2026	No	No	7	Single	Aspiration	Evening		9 AKI
2/3/2026	21	P02	56	8	27	No	Assisted	Yes	2/3/2026	No	No	2	Single	Aspiration	Night		9 GI bleed
2/3/2026	21	P20	68	8	13	No	Independent	No		No	No	2	Shared	Fall	Night		9 CHF
2/3/2026	21	P21	51	0	25	Yes	Dependent	No		No	No	0	Single	Aspiration	Evening		9 CHF
2/3/2026	21	P18	50	9	9	No	Dependent	No		Yes	No	4	Shared	None	Night		9 CHF

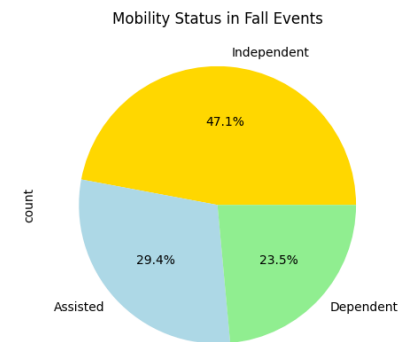
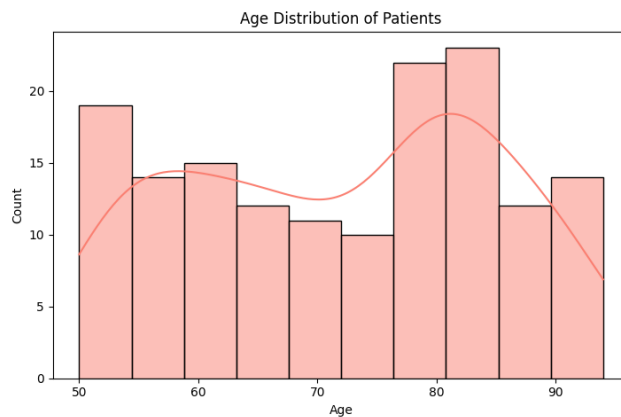
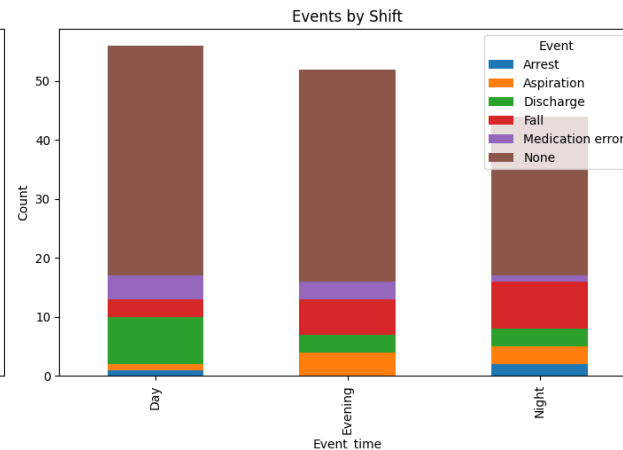
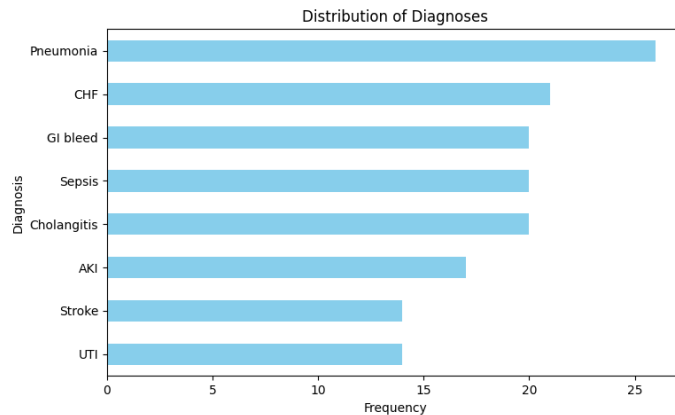


Reality in the Ward...What do we see in the data?

FROM DATA TO INSIGHT: LLM



I have a ward dataset with patient characteristics, staffing, and events. Help me: Summarize key pattern of data



Patient Profile Summary

- **Average age is 72 years** (range 50–94).
- **Top Diagnoses:** The ward primarily handles **Pneumonia (17%)**, CHF (14%), and Sepsis/Cholangitis (13%).
- **Clinical Burden:** The average Comorbidity Score is 4.4, with patients staying an average of 16 days. Pain scores (mean 4.5/10).

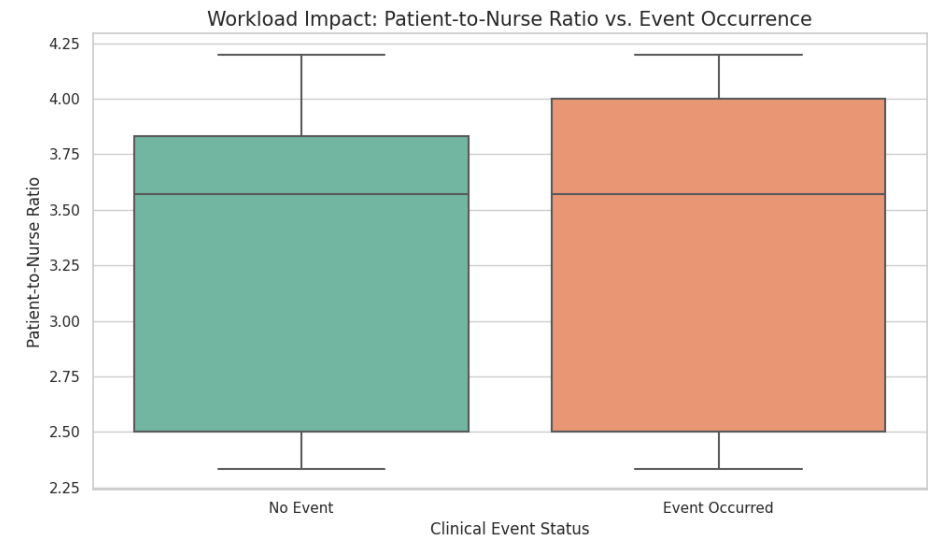


FROM DATA TO INSIGHT: LLM



I have a ward dataset with patient characteristics, staffing, and events. Help me: Summarize key pattern of data

Event Type	Count	Key Pattern Observed
Falls	17	Night Shift is high-risk: 47% of falls (8/17) occur at night, followed by evening (35%).
Aspiration	8	Most frequent in the Evening and Night shifts.
Medication Errors	8	Day Shift is the peak: 50% of errors occur during the busy day shift.
Arrests	3	Rare, but critical for "failure to rescue" studies.



Surprisingly, in this dataset, only **29% of falls** were from patients using sedatives. However, **47% of fall patients** were labeled as "Assisted" or "Dependent" for mobility. This suggests that "Mobility Status" might be a stronger predictor than "Medication" alone.



FROM DATA TO INSIGHT → Research Questions



Generate research questions based on these insights

1. Staffing & Safety

- Does a nurse-to-patient ratio during night shifts affect the risk of inpatient falls ?

2. Sedative Use & Falls

- Does sedative use increase the risk of falls compared with patients not receiving sedatives?

3. High-Risk Patient Identification

- Which clinical factors (age, comorbidity score, mobility, sedative use) best predicts inpatient falls?

4. Urinary Catheter & Outcomes

- Is urinary catheter use associated with increased risk of adverse events in hospitalized patients?



FROM DATA TO INSIGHT: DATASET 2

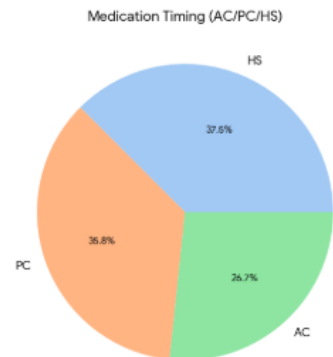
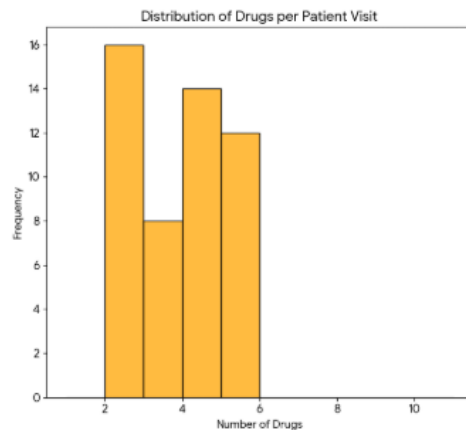
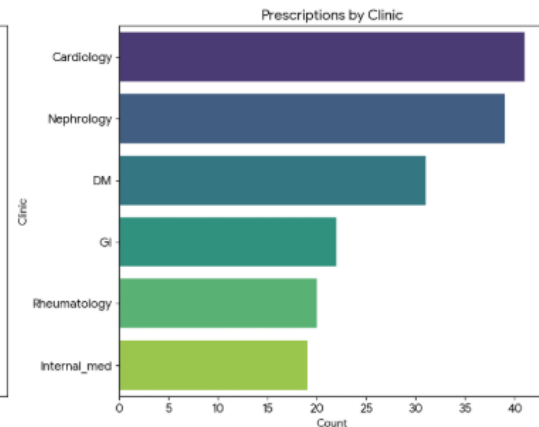
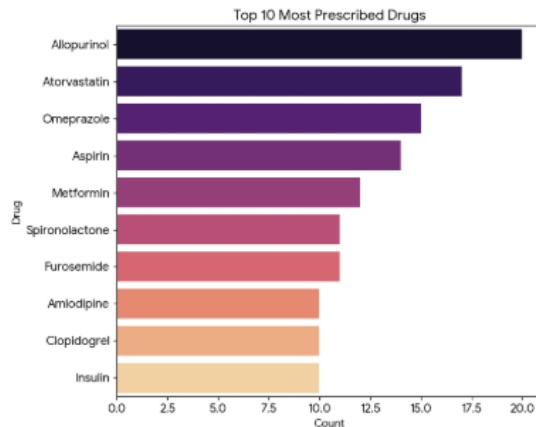
Patient_ID	Clinic	Date_start	Drug	Dose	Frequency	Timing	Prescription_duration_days	Number_ordered	Date_follow_up
P001	GI	15/01/2026	Lactulose	15 ml	TID	AC	60	87	16/03/2026
P001	Nephrology	15/01/2026	Calcium carbonate	500 mg	HS		14	41	29/01/2026
P001	Internal_med	15/01/2026	Losartan	50 mg	OD	HS	60	90	16/03/2026
P001	Internal_med	15/01/2026	Amlodipine	5 mg	HS	AC	30	41	14/02/2026
P001	GI	15/01/2026	Omeprazole	20 mg	HS	PC	30	61	14/02/2026
P002	Nephrology	21/01/2026	Spirolactone	25 mg	TID		30	23	20/02/2026
P002	Cardiology	21/01/2026	Aspirin	81 mg	BID		30	15	20/02/2026
P002	Endocrine	21/01/2026	Metformin	500 mg	TID	PC	14	72	04/02/2026
P002	Internal_med	21/01/2026	Losartan	50 mg	OD		14	50	04/02/2026
P003	Cardiology	20/01/2026	Clopidogrel	75 mg	OD		60	119	21/03/2026
P003	Endocrine	20/01/2026	Insulin	10 units	BID	PC	60	21	21/03/2026
P003	Endocrine	20/01/2026	Empagliflozin	10 mg	BID		14	76	03/02/2026
P004	Endocrine	12/01/2026	Insulin	10 units	BID	HS	14	17	26/01/2026
P004	Cardiology	12/01/2026	Clopidogrel	75 mg	HS	PC	60	47	13/03/2026
P004	Cardiology	12/01/2026	Atorvastatin	20 mg	HS	AC	30	108	11/02/2026
P004	Rheumatology	12/01/2026	Allopurinol	100 mg	HS	PC	60	52	13/03/2026
P004	Internal_med	12/01/2026	Losartan	50 mg	TID	PC	30	73	11/02/2026
P005	Nephrology	14/01/2026	Spirolactone	25 mg	HS	AC	14	90	28/01/2026
P005	GI	14/01/2026	Omeprazole	20 mg	TID	HS	30	108	13/02/2026
P006	Nephrology	01/01/2026	Sevelamer	800 mg	HS	AC	60	78	02/03/2026
P006	Nephrology	01/01/2026	Calcium carbonate	500 mg	OD		60	51	02/03/2026
P006	Rheumatology	01/01/2026	Allopurinol	100 mg	BID		30	66	31/01/2026
P006	Nephrology	01/01/2026	Furosemide	40 mg	OD	HS	60	43	02/03/2026
P007	Internal_med	25/01/2026	Amlodipine	5 mg	HS		14	49	08/02/2026
P007	Endocrine	25/01/2026	Empagliflozin	10 mg	HS	AC	30	46	24/02/2026
P008	GI	14/01/2026	Omeprazole	20 mg	OD	PC	60	36	15/03/2026
P008	Cardiology	14/01/2026	Aspirin	81 mg	HS	AC	14	97	28/01/2026



FROM DATA TO INSIGHT: LLM



I have outpatient prescription data including drug, dose, frequency, and timing
Help me: Summarize key pattern of data



1. Most Common Drugs: Allopurinol, Atorvastatin, and Omeprazole
2. Medication Timing: HS (At Bedtime) and PC (After Meals) are the most common timing instructions, used for 37% and 36% of prescriptions respectively.
3. On average, patients are prescribed 3.4 medications per visit.
4. Many patients receive drugs from multiple clinics



FROM DATA TO INSIGHT: LLM

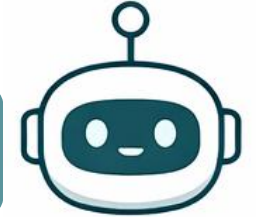


I have outpatient prescription data including drug, dose, frequency, and timing
Help me: Summarize key pattern of data

- We identified several **clinically significant interactions**,
- **Aspirin + Spironolactone** (3 cases): Aspirin can reduce the diuretic effectiveness of Spironolactone. This is a common "quiet" interaction that affects chronic management.
- **Spironolactone + Losartan** (2 cases): A high-risk combination for Hyperkalemia
- **Aspirin + Clopidogrel** (2 cases): While often intended, it requires close monitoring for GI bleeding.
- **Atorvastatin + Amlodipine** (1 case): Can increase the risk of statin-related muscle toxicity (myopathy).

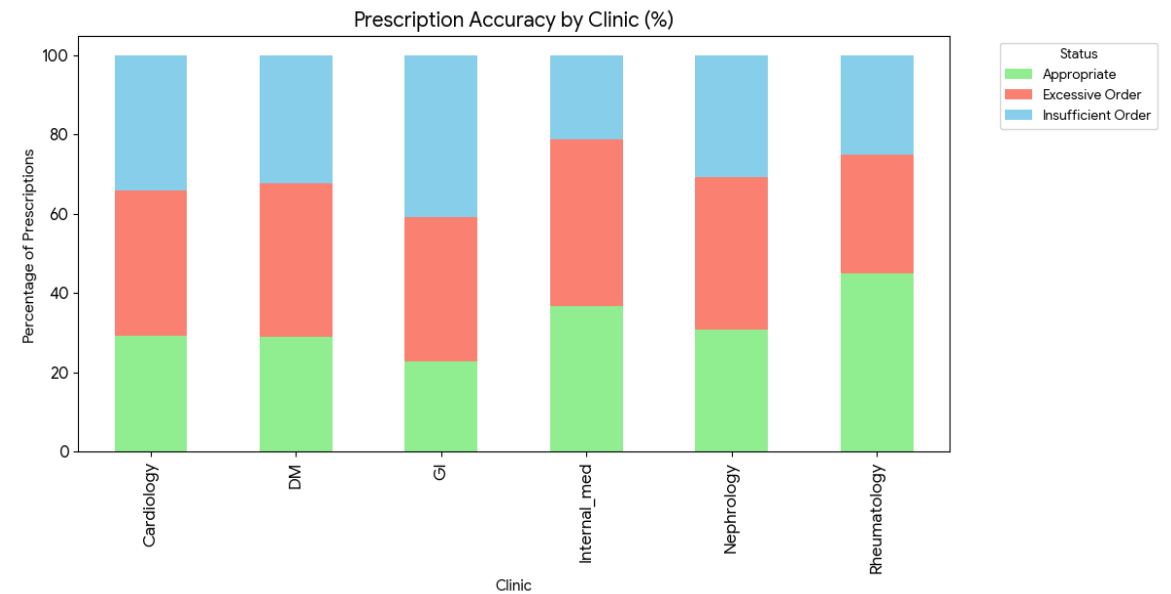


FROM DATA TO INSIGHT: LLM



Is the number of ordered drugs appropriate?

Category	Definition	Count	What it might mean
Excessive Order	Ordered > 1.5x Calculated Doses	74	Potential waste or "rounding up" errors (e.g., ordering 90 tabs for 60 days).
Insufficient Order	Ordered < 0.8x Calculated Doses	44	Risk of non-adherence: patient will run out of medication before the duration ends.
Appropriate	Within 20% of expectation	54	Likely correct calculation or minor rounding.



FROM DATA TO INSIGHT → Research Questions



Generate research questions based on these insights

1. Polypharmacy & Risk

- Does the degree of polypharmacy increase the risk of adverse drug events?

2. High-Risk Drug Combinations

- How are drug combinations associated with increased risk of complication in outpatient settings?

3. Cross-Clinic Prescribing Patterns

- Do patients receiving medications from multiple specialty clinics have higher rates of potential drug–drug interactions?

4. The Prescription Accuracy Gap

- Does 'Frequency/Duration' and 'Quantity Ordered' mismatch lead to higher rates of unscheduled visits or poor compliance?



FROM DATA TO INSIGHT: Example PROMPT

You are a clinical data scientist.

You have a dataset of hemodialysis patients from your center, including comorbidities, vascular access, intradialytic complications, nurse staffing, monthly laboratory results, and medications.

Generate potential insights from this dataset and propose five clinically impactful research questions.



Add...

- Focus on clinically meaningful relationships
- Focus on quality-of-care improvement
- Explain why the research questions matter clinically or scientifically



OUTLINE



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How Can AI Help?



From Data
to Insight



Managing Papers &
Literature Review



Study Design &
Analysis



Writing &
Publication





**Managing Papers *and*
Literature Review**

Literature Review



Literature Review

- LLMs are **not yet** reliable scientific search engines — due to hallucination
 - **Fake sources** – fabricated or non-existent citations
 - **Wrong facts** – inaccurate interpretation or invented data
 - **Misread sources** – incorrect summarization of real studies



ChatGPT



Gemini



Claude





How can I help with your research?

Do a Scientific Literature review on Pain reduction during hemodialysis vascular access cannulation



Auto ▾



Apps



Literature Review: *SciSPACE*



Pain Reduction In Hemodialysis

🗨️ 📄 📁 Pricing ...

Searching multiple databases for pain reduction methods during hemodialysis vascular access cannulation.

🔍 Searched SciSpace What are the effective methods fo... >

🔍 Searched Scispace Full Text What are the effective ... >

🔍 Searched Google Scholar ("pain reduction" OR "pain ... >

🔍 Searched Your Library No relevant PDFs found >

🔍 Searched PubMed (pain reduction[Title/Abstract] OR ... >

✅ Task Completed

Check Output

Ask anything or give follow up task...



Auto ▾

🔗 Apps



- Massive database of over 280 million research papers and integrates Large Language Models (LLMs)
- **Semantic Search Engine** (*understands meaning, not just keywords*)
- Semantic/Google scholar
- PubMed



Literature Review: *SciSPACE*



Final Outputs ▾

pain_reduction_hemodi...

All Files ▾

pain_reduction_hemodi...

combined_hemodialysis...

scholar_hemodialysis_p...

scispace_hemodialysis_...

scispace_fulltext_hemo...

pubmed_hemodialysis_...

Download All Files

Comparative summary and recommendations

This table compares interventions evaluated in the supplied trials and reviews to help clinicians prioritize options based on available evidence.

Intervention	Study design and size	Main outcome or comparative finding
EMLA cream	Randomized controlled trial, n=90	Significantly lower post-insertion VAS versus control; similar efficacy to Valsalva maneuver ¹
Lidocaine spray	Triple-blind clinical trial, n=50	More effective than ice spray and alcohol control (p=0.010) ²
Vapocoolant spray	Randomized trial, n=120	Largest pain reduction among three tested interventions (most effective in that trial) ³
Cold packs / compresses	RCT n=108 and quasi-experimental n=116	Cold packs reduced pain with borderline RCT significance; cold compresses showed significant reduction in quasi-experimental study ⁴ ⁵
Stress ball / anti-stress ball	RCT n=64 and pilot RCT n=47	Consistent pain reduction; effect increased over repeated sessions in larger RCT ⁷ ⁸
Valsalva / rhythmic breathing	RCTs (n=90 and n=120)	Reduced pain versus control; Valsalva comparable to EMLA in one trial ¹ ³
Hugo point acupressure	Randomized trial, n=120	Significant pain reduction; ranked second to vapocoolant in that trial ³
Flashlight distraction	Randomized trial, n=108	No meaningful reduction compared with control in that study ⁴

- **Automatically summarizes multiple papers**
- **Generates structured evidence tables**
- **Highlights key outcomes & comparisons**

Literature Review: SciSPACE



<input type="checkbox"/> Papers (76)	Relevance	Abstract	Intervention_and_Outcome
<input type="checkbox"/> 1. Hemodializ Hastalarında Arteriovenöz Fistül Kanülasyonuna Bağlı Ağrının Azaltılmasına Yönelik Müdahaleler Interventions to Reduce Pain During Arteriovenous Fistula Cannulation in Hemodialysis Patients 2025 · SciSpace Ahmet Topcu Nefroloji hemşireliği dergisi Journal Article 66 Cite PDF DOI	<ul style="list-style-type: none">• Relevance Score: 100/100• Relevance Tag: Highly Relevant• Reasoning: Uses systematic review to compile topical anesthetics, cold applications, distraction, and lavender for AVF cannulation pain; includes some outcome measures and feasibility notes, but lacks primary comparative data and detailed safety reporting.	Hemodializ hastaları, arteriovenöz fistül kanülasyonuna bağlı olarak sıklıkla ağrı yaşamaktadır. Bu ağrının giderilmesi, hastaların psikolojik açıdan daha iyi hissetmelerini, tedaviye uyumlarını, memnuniyetlerini ve yaşam kalitelerini artırabilir. Bu literatür incelemesi ile arteriovenöz fistül kanülasyonuna bağlı ağrıyı azaltmaya yönelik kullanılan yöntemlerin ve bu konudaki önerilerin topluca sunulması amaçlanmaktadır. Bu çalışma, bir literatür More	<ul style="list-style-type: none">• EMLA cream: Reduced VAS scores (e.g., 2.06 vs. 6.20 for control), more effective than control.• Topical cold applications/Vapocoolant spray: Reduced VAS scores (e.g., 10.7-14.0 vs. 28.8-33.4 for control/placebo), effective.• Distraction techniques (visual/auditory, stress ball, virtual reality): Reduced pain scores (e.g., VAS 4.27 vs. 6.70 fo More
<input type="checkbox"/> 2. Pengaruh Kompres Dingin terhadap Nyeri Kanulasi Arteriovena Fistula (AVF) pada Pasien yang Menjalani Hemodialisis 2025 · SciSpace Azza Husnu Wahda ... +2 more Quantum Wellness : Jurnal Ilmu Kesehatan Journal Article 66 Cite Get PDF DOI	<ul style="list-style-type: none">• Relevance Score: 100/100• Relevance Tag: Highly Relevant• Reasoning: Uses cold compresses to reduce AVF cannulation pain in dialysis patients; measures pain with VAS, reports significant reduction, notes safety, simplicity, and easy integration into routine care.	Hemodialysis is a medical procedure used to correct blood biochemical abnormalities caused by impaired kidney function, with the aid of a hemodialysis machine. One of the most commonly used accesses in this procedure is the Arteriovenous Fistula (AVF), which is an anastomosis between the artery and vein in the arm or other parts of the body to facilitate the cannulation process. However, during the AVF cannulation procedure, patients often experie More	The primary intervention was cold compresses. Pain intensity was measured using a visual analog scale (VAS). Cold compresses significantly reduced pain intensity (p-value of 0.000). The intervention group showed significantly greater effectiveness than the control group (p-value of 0.000).
<input type="checkbox"/> 3. Effect of stress ball use on cannulation-related invasive pain in Hemodialysis patients: a randomized controlled, single-blind study 2025 · SciSpace Betül Tosun ... +3 more BMC Nephrology Journal Article 66 Cite Get PDF DOI	<ul style="list-style-type: none">• Relevance Score: 100/100• Relevance Tag: Highly Relevant• Reasoning: Uses stress balls to lower VAS pain scores during dialysis cannulation; includes validated pain scale, notes simple low-cost implementation, but lacks multiple interventions or safety data.	Stress ball usage is one of the non-pharmacological methods that help reduce pain and anxiety by diverting an individual's attention elsewhere. This study evaluates the impact of stress ball use on pain levels during cannulation in hemodialysis patients. A single-blind, randomized, controlled design was used. Sixty-four participants were divided into experimental (n = 32) and control groups (n = 32). The experimental group used a stress ball for 3 min before a More	The primary intervention was stress ball use for 3 minutes before and during cannulation. Key outcomes included significantly lower median VAS scores in the intervention group compared to the control group (p < 0.01), with a significant decrease in VAS scores over 12 sessions (p < 0.01). The intervention was more effective than the control, with effectiveness increasing over time (p = 0.016).
<input type="checkbox"/> 4. Which Intervention is Most Effective? Rhythmic Breathing, Hugo Point Acupressure, and Vapocoolant Spray for Pain Relief During Needle Insertion in Hemodialysis Patients: A Randomized Controlled Trial 2025 · SciSpace	<ul style="list-style-type: none">• Relevance Score: 100/100• Relevance Tag: Highly Relevant• Reasoning: Uses rhythmic breathing, Hugo Point acupressure, and vapocoolant spray to compare pain scores during needle	Objective: Pain from needle insertion during hemodialysis is a common challenge that requires effective pain management to ensure patient comfort. This study aimed to compare the efficacy of three pain management techniques (rhythmic breathing, Hugo Point	Vapocoolant spray, Hugo Point acupressure, and rhythmic breathing were used. Vapocoolant spray showed the most significant pain reduction (mean VAS 25.59 ± 3.6), followed by Hugo Point acupressure (33.14 ± 4.264), and rhythmic breathing (37.79 ±

Chat with AI: SciSPACE



Upload or open any research paper

The screenshot shows a web browser displaying a research paper. At the top, there is a search bar with the text 'Explain math & table' and a magnifying glass icon. To the right of the search bar, there are icons for zooming in and out, and a refresh icon. The page header includes the 'nursing reports' logo on the left and the 'MDPI' logo on the right. The main title of the article is 'A Pilot Randomised Controlled Trial on the Effectiveness of an Anti-Stress Ball Technique for Pain Reduction during Vascular Access Cannulation in Haemodialysis Patients'. Below the title, the authors are listed as 'Magda Dinis¹ and Joana Pereira Sousa^{2,*}'. There are two footnotes: footnote 1 identifies the School of Health Sciences, Polytechnic of Leiria, Diaverum, F3080-847 igueira da Foz, Portugal; footnote 2 identifies the School of Health Sciences, Polytechnic of Leiria, Center for Innovative Care and Health Technology, ciTechCare, 2411-901 Leiria, Portugal. An asterisk indicates that Joana Pereira Sousa is the correspondence author, with the email address joana.sousa@ipleiria.pt. The abstract begins with 'Background: Pain in patients under haemodialysis affects the quality of life of chronic renal patients. Distraction has been effective in controlling pain induced by the insertion of needles. Once applied adequately, distraction promotes endorphin release, with efficacy in acute pain management. This study evaluates pain perception while puncturing the haemodialysis device, using an anti-stress ball as a distraction strategy. Methods: This study is a retrospectively registered pilot randomised controlled trial of 47 chronic renal patients undergoing regular haemodialysis programs in a dialysis unit, in the central region of Portugal. Patients were randomly allocated into control and intervention groups. The intervention group received an anti-stress ball on the opposite limb of the vascular access, while the control group underwent pain evaluation without any intervention. Pain was monitored using a numeric pain scale. The study aimed to evaluate pain during vascular access cannulation and explore the potential benefits of using an anti-stress ball to reduce this pain. Results: ...'

The screenshot shows the chat interface of the SciSPACE application. At the top, there is a 'Chat' header with a speech bubble icon. Below the header, there is a section for 'Suggestions (13 results)'. Underneath, there are two tabs: 'General (13)' and 'My questions (0)'. The 'General (13)' tab is selected, and it displays a list of suggestions:

- Generate summary of this paper
- Results of the paper
- Conclusions from the paper
- Explain Abstract of this paper
- What are the contributions of this paper
- Find Related Papers
- Explain the practical implications of this paper
- Summarise introduction of this paper
- Literature survey of this paper

At the bottom of the chat interface, there is a text input field with the placeholder text 'Ask any question...'. To the left of the input field, there is a toggle switch labeled 'High Quality'. To the right of the input field, there is a summation symbol (Σ) icon. A blue circular profile icon is visible on the right side of the chat interface.

You Can Ask...

- Summarize the paper
- Extract key results
- Explain methods & statistics
- Identify limitations
- Find related studies

Chat with AI: *SciSPACE*



what is anti-stress ball

8:47 AM

- **Natural Language Interaction**
 - Ask questions like you talk
 - No need for complex search terms
- **Interactive Exploration**
- **Instant Understanding**
 - Summarizes complex papers
 - Explains concepts in simple terms

Anti-Stress Ball as a Distraction Technique

An anti-stress ball, in the context of the provided study, is a simple, non-invasive tool used as a distraction technique to help reduce pain perception during medical procedures, specifically vascular access cannulation in hemodialysis patients [1] [2].

Mechanism of Action

- **Distraction from Pain:** The primary function of an anti-stress ball is to divert a patient's concentration away from painful stimuli, such as needle insertion. This distraction can reduce anxiety, fear, and the intensity of pain itself [3].
- **Endorphin Release:** When properly used, distraction techniques like an anti-stress ball can promote the release of endorphins, which are natural pain-relieving chemicals in the body, making them effective in acute pain management [3].

Application in Hemodialysis

- **Intervention Method:** In the study, patients in the intervention group were given an anti-stress ball to squeeze and repeatedly release on the limb opposite to where the vascular access was being cannulated. They were instructed to look away from the procedure until cannulation was complete [2].
- **Effectiveness:** The study found that patients using the anti-stress ball experienced significantly lower pain scores during vascular access cannulation compared to a control group [1]. This suggests that distraction through an anti-stress ball can reduce pain perception for chronic renal patients undergoing hemodialysis [1].
- **Practical Benefits:** The anti-stress ball technique is considered a useful intervention due to its effectiveness and low cost, making it a recommended option for healthcare professionals caring for hemodialysis patients [4].

In summary, an anti-stress ball serves as a cost-effective and non-pharmacological method to manage pain by providing a distraction that helps patients cope with the discomfort and anxiety associated with procedures like vascular access cannulation.

Quickly ask these questions

1. What specific endorphins are released during distraction?
2. How was pain measured in the study?
3. What limitations were identified in the trial?

Finding Evidence: *Consensus*



<https://consensus.app/>



Research starts here

Pain reduction during hemodialysis vascular access



Pro

Deep

Corpus



Filter



Try a Deep Search

Create a table

Try the Consensus Meter



Finding Evidence: *Consensus*



- AI-powered academic search engine specifically designed to help researchers "*find the consensus*" within scientific literature.
- Study Snapshots & Extraction
- Evidence mapping over time

Pain Reduction During Hemodialysis Vascular Access: Key Evidence

Pain from vascular access cannulation is frequent, affects quality of life, and can undermine adherence to hemodialysis. Recent trials and reviews show multiple **effective pharmacologic and non-pharmacologic options** that can be combined and tailored to the patient.

Evidence Landscape

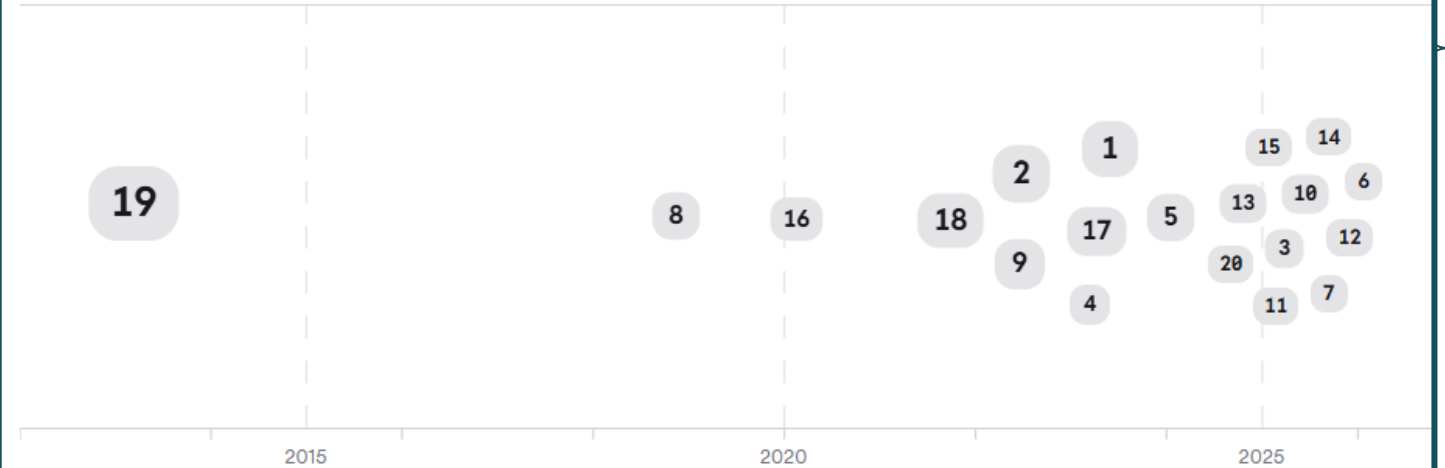


FIGURE 1 Randomized trials of AVF pain interventions over time.

Finding Evidence: *Consensus*



Are 12-hour nurse shifts better than 8-hour shifts?

Pro · 2 steps · 20 sources >

While **12-hour shifts are often preferred by nurses**, they are generally linked to **more fatigue and somewhat worse safety/quality indicators** than 8-hour shifts.

Are 12-hour nurse shifts better for nurses and patients than 8-hour shifts? N = 16



All details ▾

Results



1 Impact of nurses' working hours on patient safety indicators: comparing 8- and 12-hour shift patterns

KEY TAKEAWAY · Switching from a 12-hour to an 8-hour nursing shift pattern may increase medication administration errors, but overall patient safety incidents remain similar between the two shift patterns.

2025 · 0 citations · Mahmoud Ahmed Hussien et al. · British Journal of Healthcare ...

2 Eight-hour versus 12-h shifts in an ICU: Comparison of nursing responses and patient outcomes.

KEY TAKEAWAY · 12-hour shifts in ICU are popular with nurses, reduce sick and family leave days, and do not compromise patient outcomes compared to 8-hour shifts.

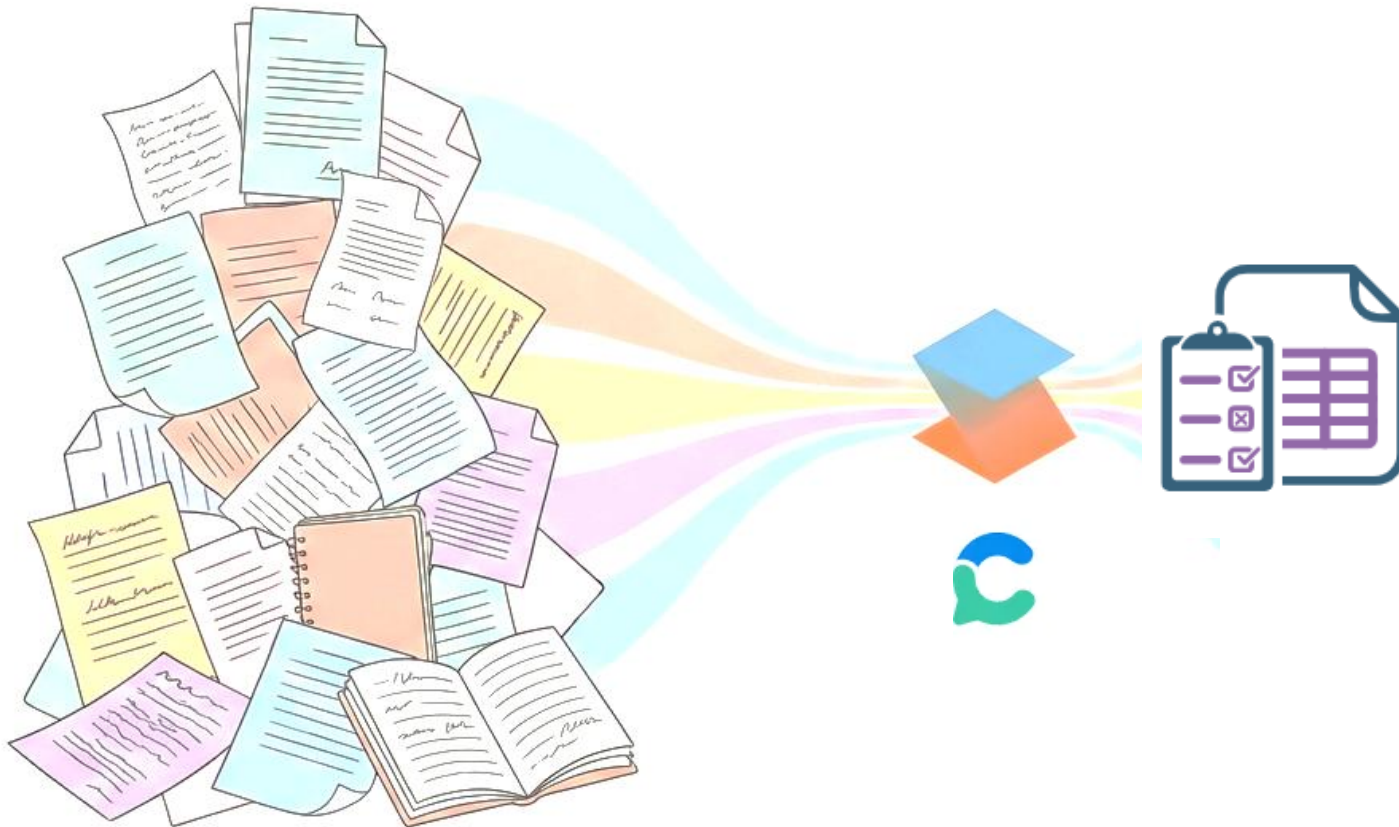
OBSERVATIONAL STUDY

2019 · 24 citations · J. Webster et al.

PDF

- Consensus meter (quick yes/no overview)
- Pro & con analysis

Managing Papers and Literature Review



From weeks of manual searching
→ *minutes to hours* with AI-assisted
review

Highlight key outcomes

Synthesis pro and con across studies

Visualizing agreement across studies
over time

OUTLINE



Why is Research
Hard?



How Can AI Help?



From Data
to Insight



Managing Papers &
Literature Review



Study Design &
Analysis



Writing &
Publication



AI prompt

AI is powerful....but only as good as the question you ask

A good prompt = clear goal + enough context + specific output.





หากต้องการนำรถไปล้างร้านใกล้บ้าน ห่างไป 25 เมตร ควรเดินหรือขับรถไป



สำหรับการเดินทางในระยะทาง **25 เมตร** มีข้อแนะนำดังนี้ครับ

1. การเดิน (แนะนำวิธีนี้):

- **ระยะทาง:** 25 เมตร สั้นมาก (ประมาณ 30-40 ก้าวเดินปกติ) ใช้เวลาเดินไม่ถึง 1 นาที
- **ความสะดวก:** ไม่ต้องสตาร์ทรถ ไม่ต้องหาที่จอดรอ และไม่ต้องกังวลเรื่องการขยับรถในพื้นที่แคบ
- **สุขภาพ:** เป็นการยืดเส้นยืดสายที่ดีครับ

2. การขับรถ:

- **ความจำเป็น:** ควรขับไปก็ต่อเมื่อคุณมีสัมภาระหนักในรถที่ต้องจัดการ หรือคุณมีข้อจำกัดด้านสุขภาพที่ทำให้เดินลำบาก
- **ข้อควรระวัง:** การสตาร์ทเครื่องยนต์เพื่อขับในระยะสั้นมาก ๆ (Short trip) บ่อยครั้ง อาจทำให้เครื่องยนต์และแบตเตอรี่ทำงานได้ไม่เต็มประสิทธิภาพเนื่องจากเครื่องยังไม่ทันร้อนถึงอุณหภูมิใช้งาน

สรุป: หากคุณสุขภาพแข็งแรงดี **การเดินไป** เป็นทางเลือกที่ง่ายและรวดเร็วที่สุดครับ ส่วนรถนั้นค่อยขับไปส่งให้ที่ร้านเมื่อพร้อมล้างครับ



ฉันท้องการนำรถจากที่บ้านไปล้างที่ร้านที่ใกล้มาก เพียง 25 เมตร ควรเดินหรือขับรถยนต์ไป
คิดถึงความปลอดภัยและสิ่งแวดล้อม



หากพิจารณาจากระยะทางเพียง 25 เมตร ซึ่งเป็นระยะที่ใกล้มาก (ประมาณการเดินเพียง 30-40 ก้าว) การ "เดิน" นำรถไปส่งที่ร้าน หรือใช้วิธีเข็น (ถ้าทำได้และปลอดภัย) จะเป็นทางเลือกที่ดีที่สุดด้วยเหตุผลดังนี้ครับ:

1. ด้านความปลอดภัย:

- **ถนนแคบ:** การสตาร์ทรถยนต์เพื่อขับในระยะทางสั้นมากๆ (Short trip) เครื่องยนต์จะยังไม่ทันถึงอุณหภูมิทำงานที่เหมาะสม ซึ่งส่งผลเสียต่อเครื่องยนต์ในระยะยาวมากกว่าการขับระยะไกล
- **ประหยัดน้ำมัน:** แม้การขับ 25 เมตรจะใช้น้ำมันน้อยจนเกือบวัดไม่ได้ แต่การสตาร์ทเครื่องยนต์หนึ่งครั้งต้องใช้พลังงานจากแบตเตอรี่และน้ำมันมากกว่าการเดินแน่นอน
- **ลดการสึกหรอ:** ลดการทำงานของระบบสตาร์ทและระบบเบรกโดยไม่จำเป็น

2. ด้านสิ่งแวดล้อม:

- **ลดมลพิษ:** การสตาร์ทเครื่องยนต์เย็น (Cold Start) เป็นช่วงที่ปล่อยมลพิษออกมาสูงที่สุด เพราะแคทตาลิสติกคอนเวอร์เตอร์ (ตัวกรองไอเสีย) ยังไม่ร้อนพอที่จะทำงานได้อย่างเต็มประสิทธิภาพ
- **ลดคาร์บอนฟุตพริ้นท์:** การเดินมีค่าการปล่อยก๊าซคาร์บอนเป็นศูนย์ (Zero Emission)

สรุปคำแนะนำ:

ในระยะทางเพียง 25 เมตร **ควรใช้วิธีเดินไปครับ** โดยหากเป็นไปได้ ให้สตาร์ทรถเพื่อถอยออกจากบ้านแล้วดับเครื่อง จากนั้นขอแรงเจ้าหน้าที่ที่ร้านช่วยเข็นเข้าไปในช่องล้างรถ (ถ้าทางไม่ลาดชันและปลอดภัย) แต่หากจำเป็นต้องขับจริงๆ ควรใช้วิธีขับแบบนุ่มนวลที่สุดและดับเครื่องทันทีที่ถึงจุดจอดครับ



ฉันต้องการนำรถไปล้างที่ร้าน ที่อยู่ห่างจากบ้านเพียง 25 เมตร คิดจากหลักความเป็นจริงและสิ่งที่ทำได้ ควรเดิน หรือขับรถไปที่ร้าน



สำหรับการตัดสินใจว่าจะเดินหรือขับรถไปที่ร้านล้างรถซึ่งห่างจากบ้านเพียง 25 เมตร หากพิจารณาจากหลักความเป็นจริงและสิ่งที่ทำได้ มีคำแนะนำดังนี้ครับ:

1. ขับรถไป (ทางเลือกที่แนะนำที่สุด)

เนื่องจากจุดประสงค์คือการ "นำรถไปล้าง" รถจึงเป็นสิ่งของชิ้นใหญ่ที่เราไม่สามารถแบกหรือเคลื่อนย้ายด้วยวิธีอื่นได้สะดวก การขับรถเข้าไปในร้านโดยตรงเป็นวิธีที่เป็นรูปธรรมและเป็นไปได้จริงที่สุด เพราะ:

- พนักงานล้างรถจำเป็นต้องให้คุณขับรถเข้าไปจอดในจุดพักรถหรือช่องล้างรถโดยเฉพาะ
- การขับรถเพียง 25 เมตร (ประมาณความยาวรถ 5-6 คันต่อกัน) ใช้เวลาไม่ถึง 10 วินาที และสะดวกต่อการส่งมอบกุญแจและแจ้งรายละเอียดการล้างครับ

2. เดินไป (ทำได้ในกรณีติดต่อสอบถาม)

คุณควรเลือกการ "เดิน" ก็ต่อเมื่อ:

- ต้องการไปเช็คคิวที่ร้านก่อนว่าว่างหรือไม่
- ต้องการเดินไปดูราคาหรือโปรโมชั่นก่อนจะวนรถมา
- เมื่อฝากรถไว้ที่ร้านเสร็จแล้ว การเดินกลับบ้านระยะ 25 เมตรนั้นสะดวกและรวดเร็วมาก

สรุปตามหลักการใช้งาน:

คุณควร "ขับรถไป" ที่ร้านเพื่อส่งมอบรถให้พนักงานครับ เพราะต่อให้ระยะทางจะใกล้มากจนดูเหมือนเดินได้ แต่ในเมื่อเป้าหมายคือการนำรถไปรับบริการ ตัวรถจำเป็นต้องไปอยู่ที่นั่นด้วยครับ

AI prompt

Chain of thought

- Think step by step and explain....

Set a role

- Clinician
- Researcher
- Reviewer

Ask for reasoning

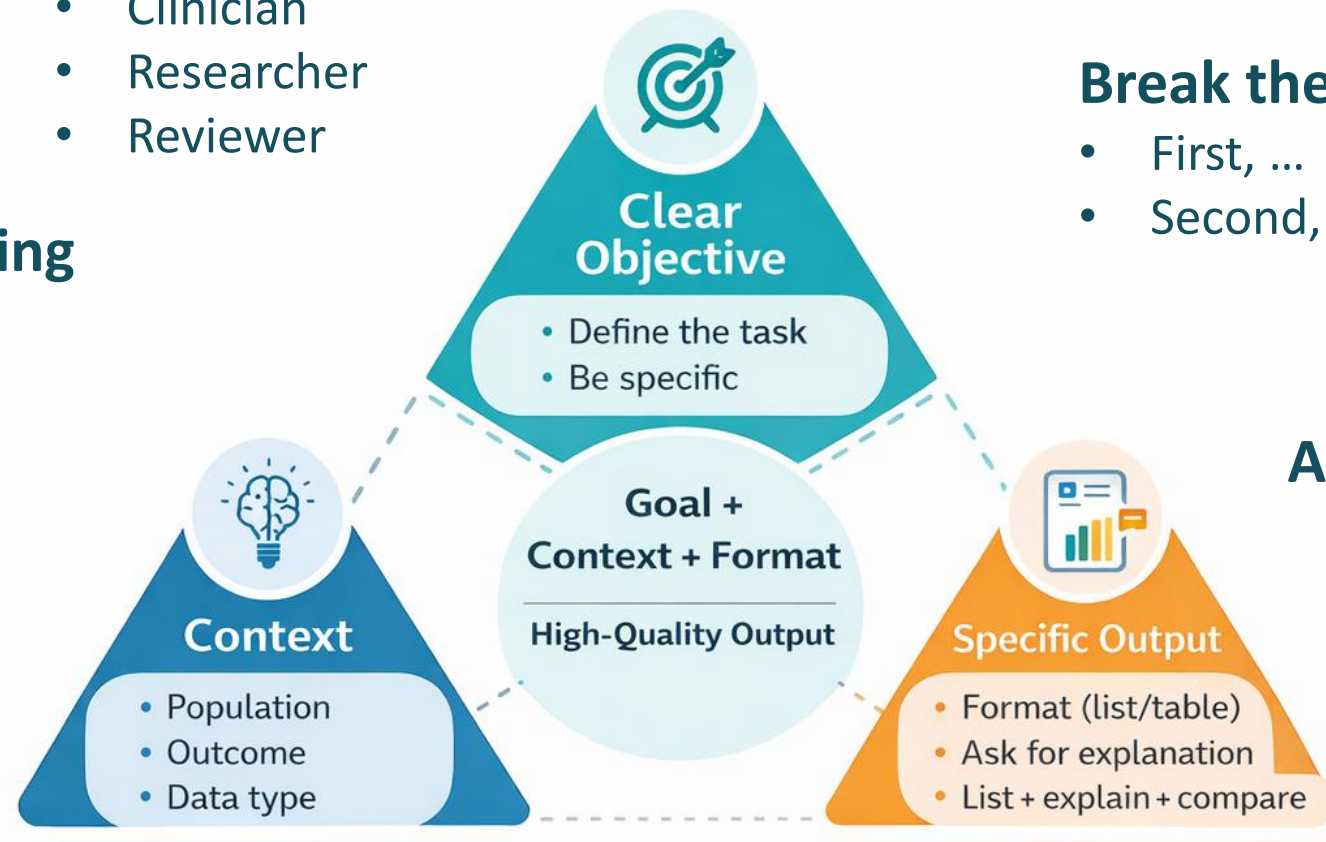
Use constraints

- Focus on....
- Do not include....

Break the task into steps

- First, ...
- Second, ...

Ask for comparison



Study design and Methods



I' m a nephrologist.

I am studying ICU patients with CRRT using EHR data.

My goal is to evaluate the association between fluid overload and 72-hour mortality.

Suggest appropriate statistical methods and explain why



Study design and Methods



I am a **nephrologist** studying ICU patients receiving CRRT using EHR data.

My objective is to evaluate the association between fluid overload and 72-hour mortality.

Propose appropriate statistical methods to address this research question

Justify why each method is suitable for this clinical context

Focus on clinically meaningful interpretation and real-world applicability.

Set a role → clinical perspective

Give context → relevant data

Define objective → clear question

Specify task → actionable output

Ask for reasoning → deeper insight

Add constraints → practical answers

Study design and Methods



Act as a clinical researcher. Based on this dataset, generate 5 clinically impactful research questions and explain why each matters.

Act as a biostatistician. Recommend the best primary and secondary analyses for this study and explain the rationale.

List 10 potential confounders for this study, grouped into demographics, disease severity, treatment-related factors, and time-dependent variables.

Data Analysis

AI can guide which statistical methods to use

Do NOT upload full datasets to public AI for analysis

Use statistical software: SPSS, STATA, R, Python
AI can help generate code and analysis plans

Always keep a human in the loop
Review and validate results carefully

AI supports analysis....*but does not replace statistical responsibility*



Data Analysis

Data cleaning

**Natural language
preprocessing**

**Model
development**

Model evaluation

**Reporting/
Visualization**



Data Analysis

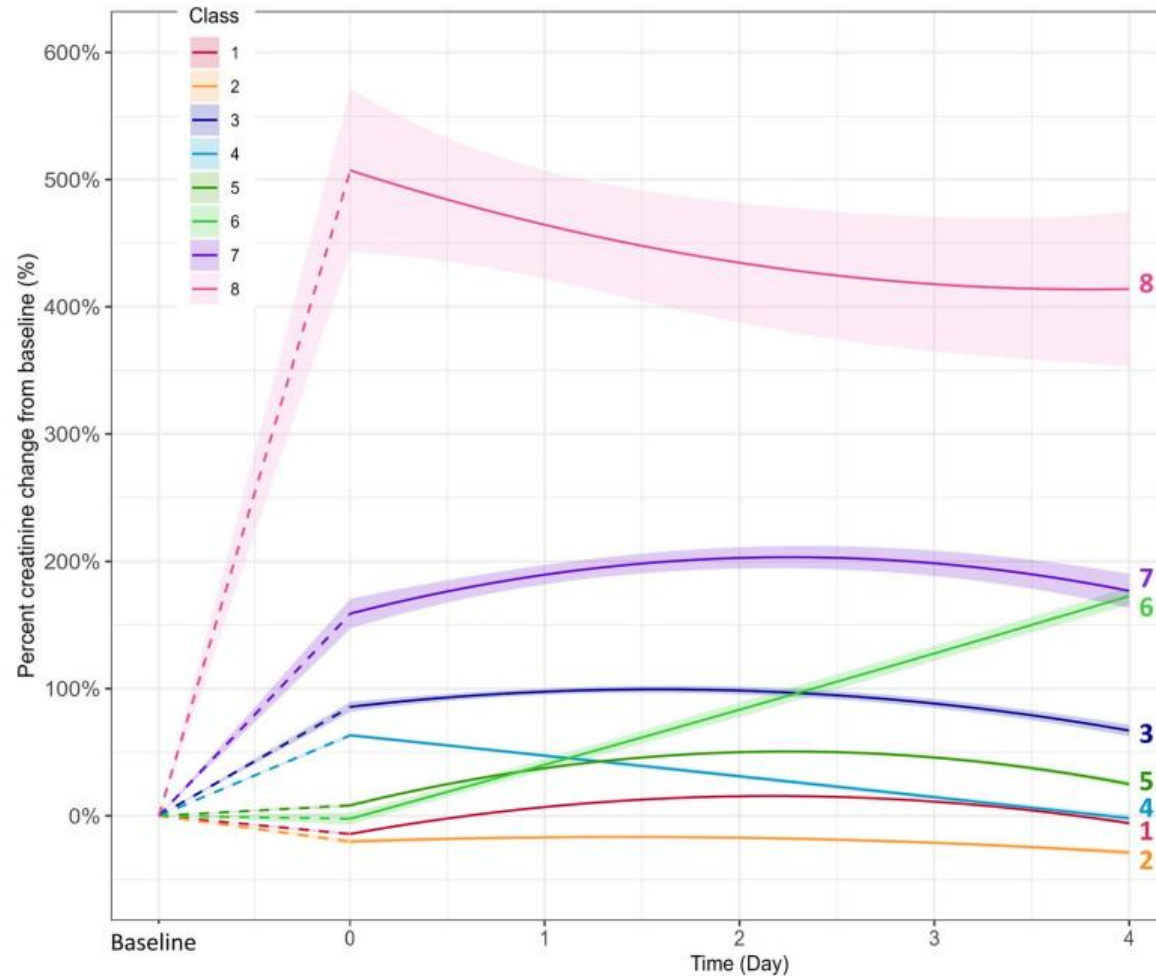
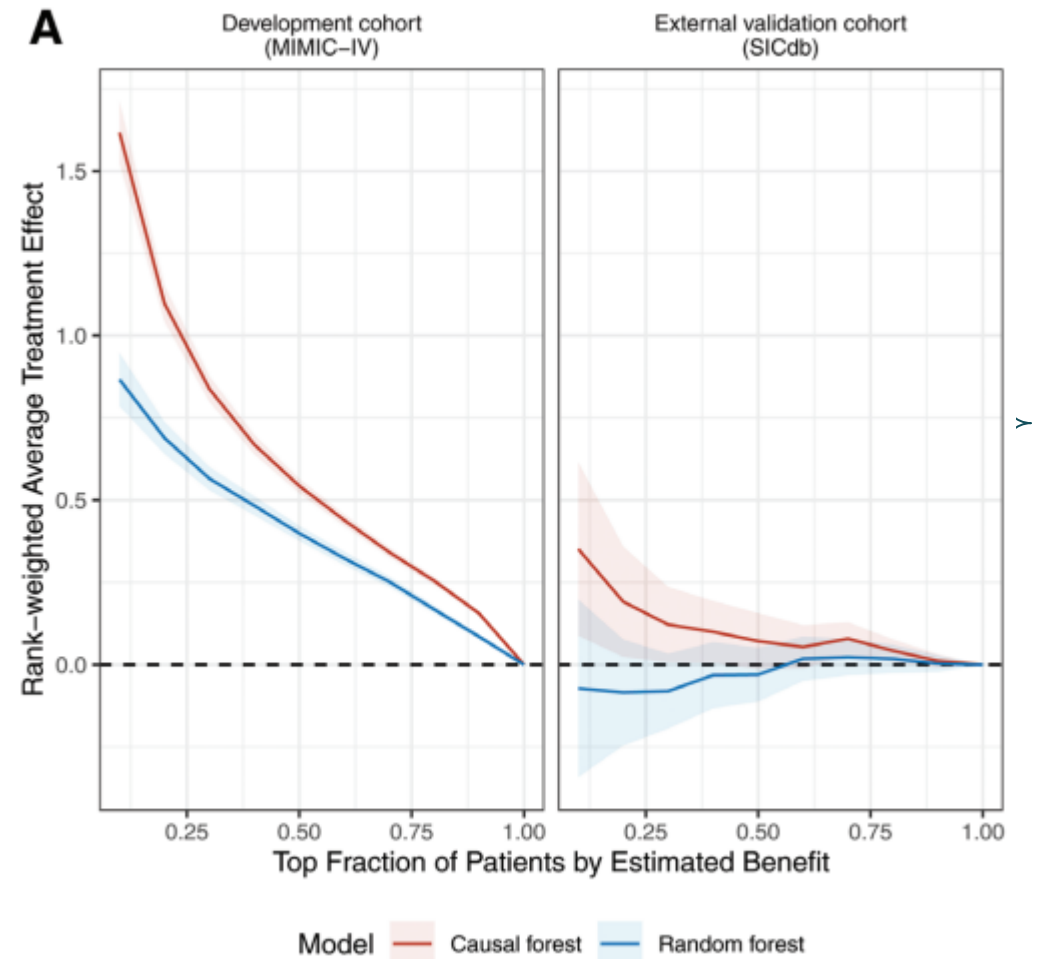
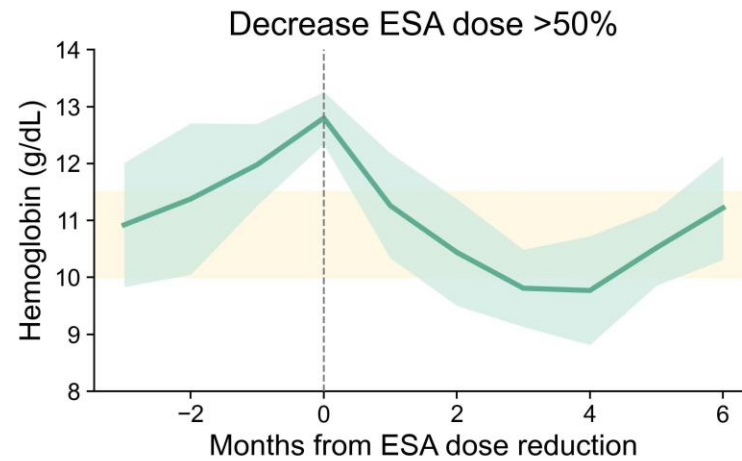
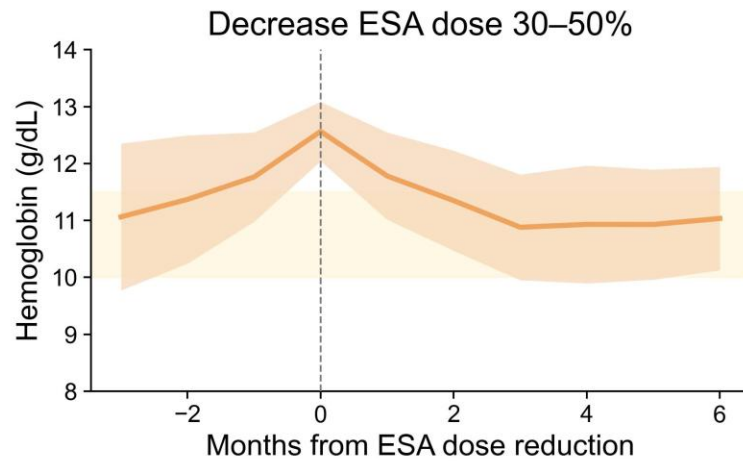
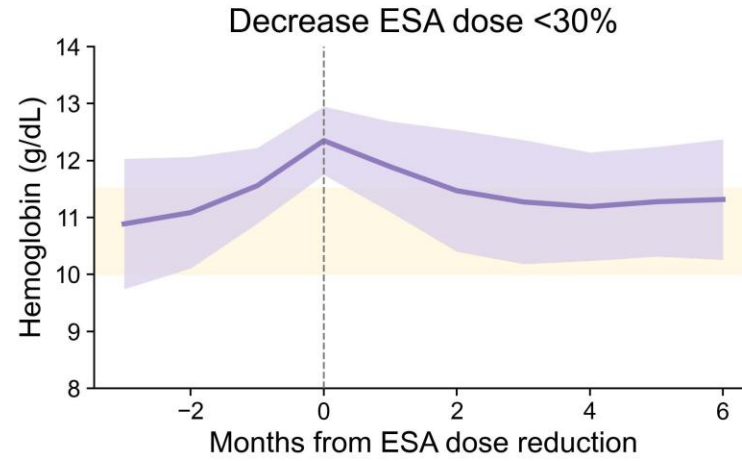
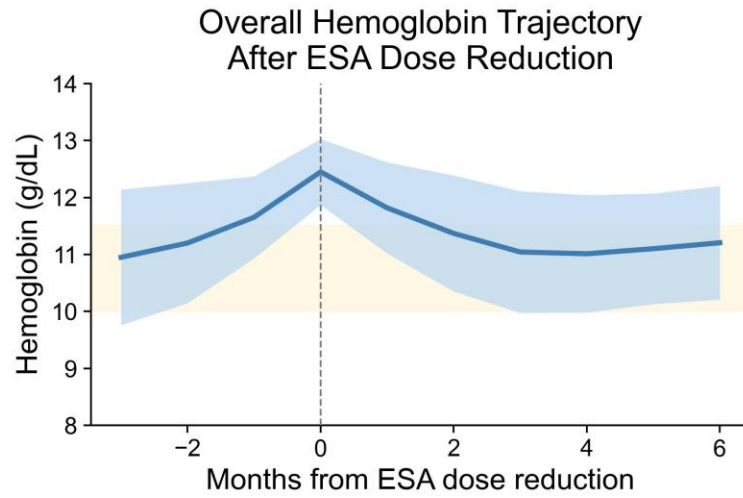


Fig. 2 AKI in critically ill patients with sepsis classification based on serum creatinine trajectories in development cohort



Data Analysis



Case: Using AI in an R2R Hemodialysis Nursing Study



Project #1 *Pain reduction*



How to reduce pain...





Comparative summary and recommendations

This table compares interventions evaluated in the supplied trials and reviews to help clinicians prioritize options based on available evidence.

Intervention	Study design and size	Main outcome or comparative finding
EMLA cream	Randomized controlled trial, n=90	Significantly lower post-insertion VAS versus control; similar efficacy to Valsalva maneuver ¹
Lidocaine spray	Triple-blind clinical trial, n=50	More effective than ice spray and alcohol control (p=0.010) ²
Vapocoolant spray	Randomized trial, n=120	Largest pain reduction among three tested interventions (most effective in that trial) ³
Cold packs / compresses	RCT n=108 and quasi-experimental n=116	Cold packs reduced pain with borderline RCT significance; cold compresses showed significant reduction in quasi-experimental study ⁴ ⁵
Stress ball / anti-stress ball	RCT n=64 and pilot RCT n=47	Consistent pain reduction; effect increased over repeated sessions in larger RCT ⁷ ⁸
Valsalva / rhythmic breathing	RCTs (n=90 and n=120)	Reduced pain versus control; Valsalva comparable to EMLA in one trial ¹ ³
Hugo point acupuncture	Randomized trial, n=120	Significant pain reduction; ranked second to vapocoolant in that trial ³
Flashlight distraction	Randomized trial, n=108	No meaningful reduction compared with control in that study ⁴



Project #1 *Pain reduction*

Research gap?

Uncertain *optimal duration*
Limited head-to-head comparisons

Study design



This is a practical nursing quality-improvement study in a hemodialysis unit. Suggest the **best study design** to compare **different durations** of cold pack application before cannulation to reduce pain.

Propose inclusion and exclusion criteria, and outcome measures for this crossover study.

What is the best way to **measure pain** during vascular access cannulation in this study?



Project #1 *Pain reduction*

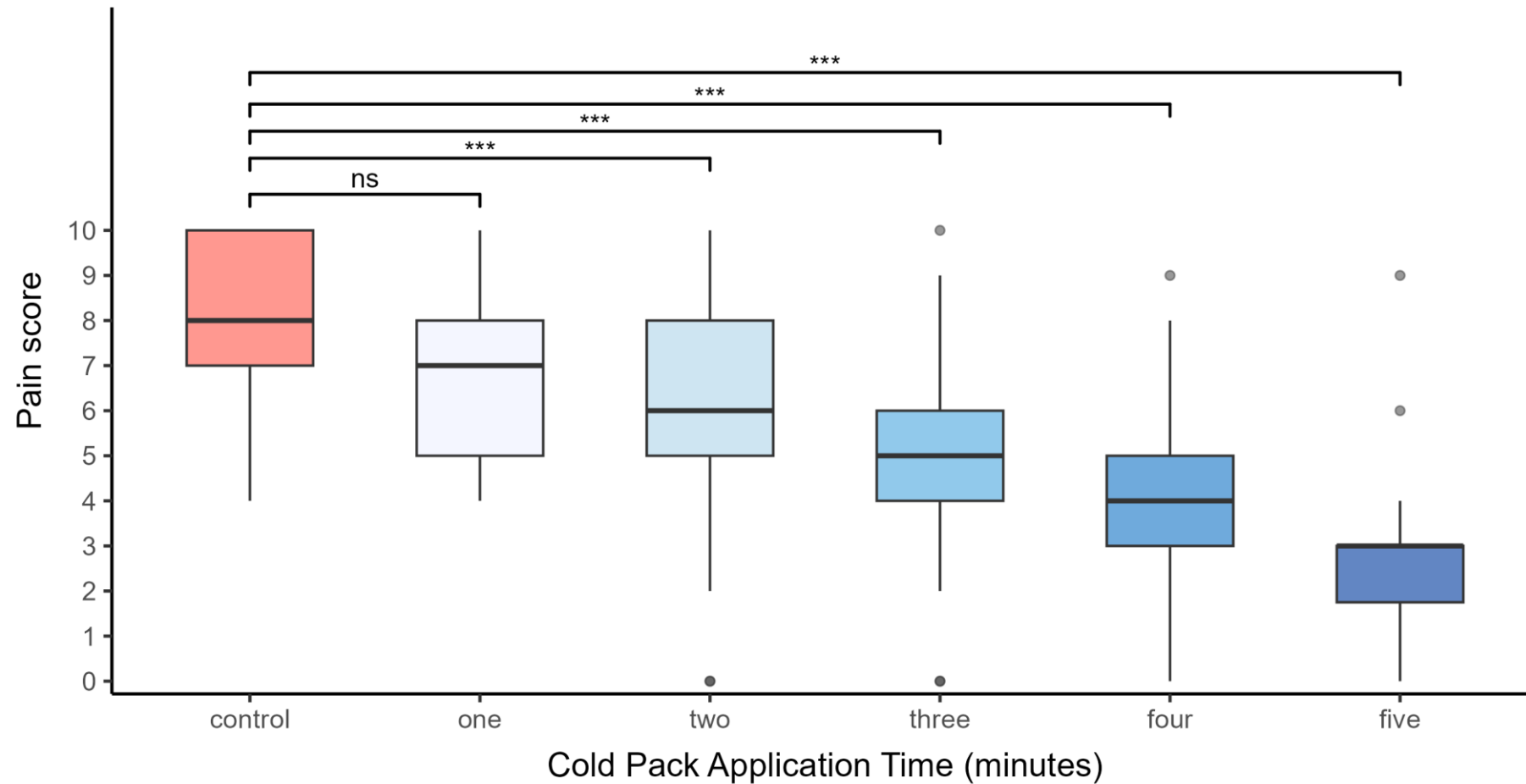
Study Analysis



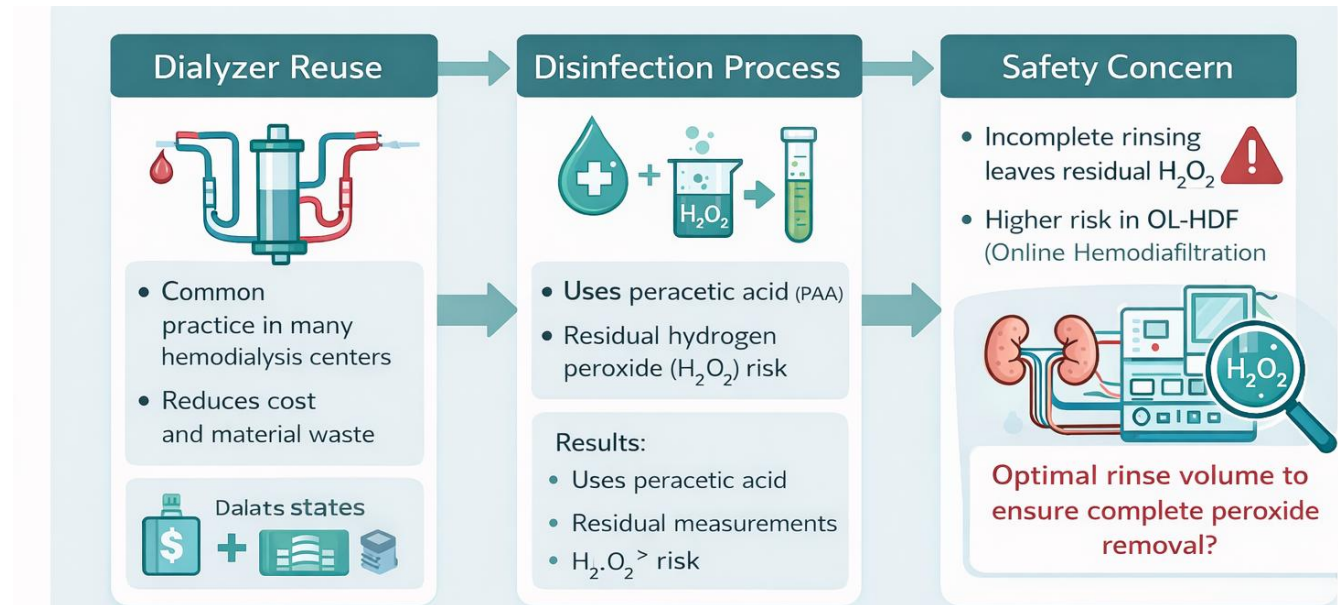
I have a prospective crossover study with repeated pain scores from the same hemodialysis patients across 6 sessions: no cold pack, then 1 to 5 minutes of application. Pain score is ordinal/non-normally distributed. What statistical methods should I use and why?

Project #1 *Pain reduction*

Pain scores during cannulation with and without cold pack application



Project #2 *Dialyzer Reuse and Rinse Volume*



Does increasing dialyzer reuse require higher rinse volume to achieve complete peroxide clearance?

Project #2 *Dialyzer Reuse and Rinse Volume*

Research gap?

No clear rinse protocol
Limited data on reuse vs peroxide clearance

Study analysis



I have rinse volume and reuse number data.
Suggest appropriate statistical methods to detect threshold effects.

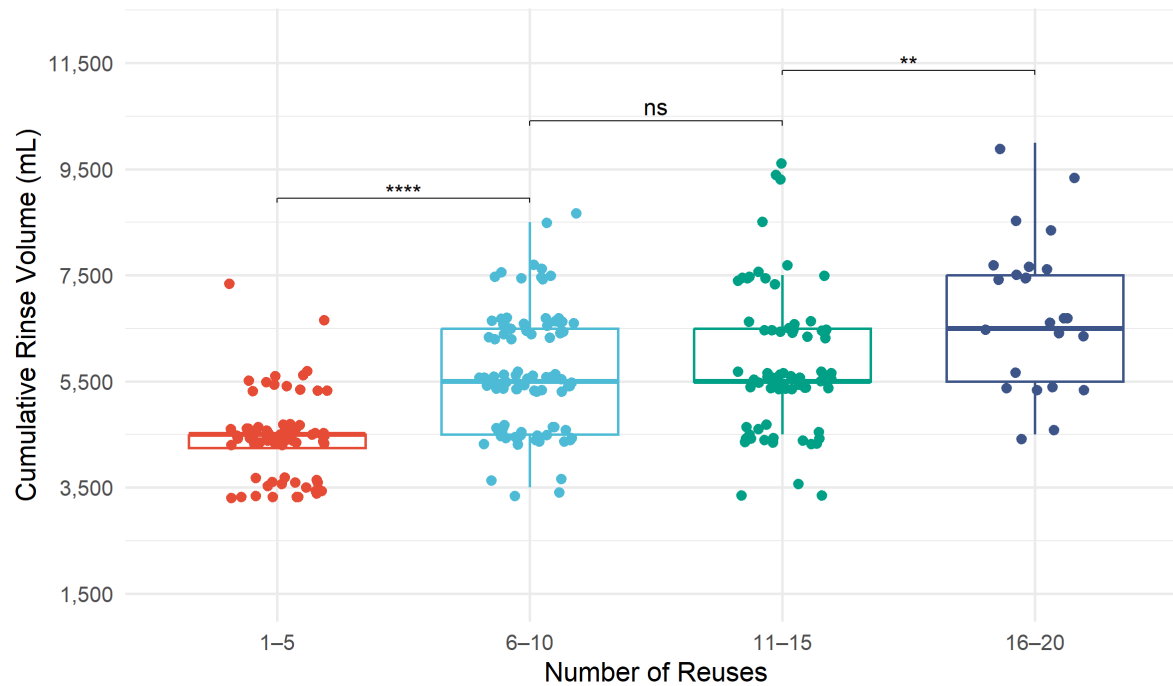
How can I identify breakpoints where rinse volume requirements change significantly?

Write R code for segmented regression to model the relationship between reuse number and rinse volume.

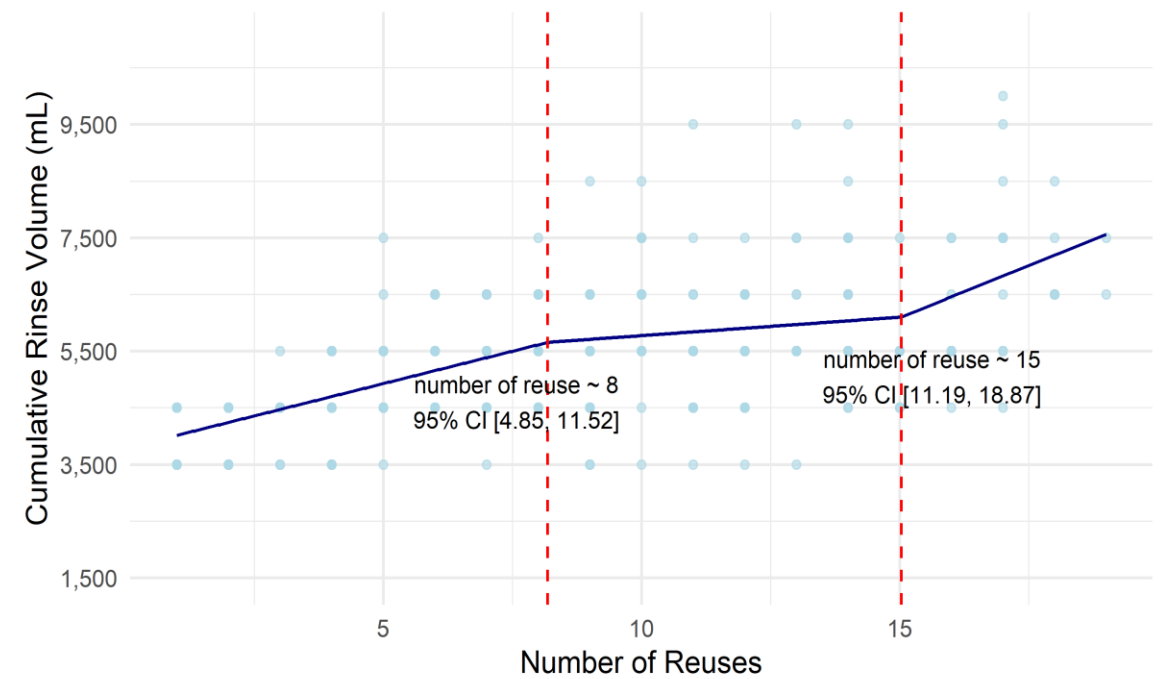


Project #2 Dialyzer Reuse and Rinse Volume

Cumulative rinse volume achieving negative residual peroxide test



Segmented regression with two breakpoints



Effect of Cold Pack Duration on Cannulation Pain in Hemodialysis Patients

Authors: Therat Chatsirithitikon, Patcharin Injan, Salin Wattanatorn, Aschariya Wipattanakitcharoen, Paweena Susantitaphong, Khajohn Tiranathanagul, Pisut Katavetin, Kearkiat Praditpornsilpa, Kullaya Takkavatakarn
 Division of Nephrology, Department of Medicine, Faculty of Medicine, Chulalongkorn University and King Chulalongkorn Memorial Hospital, Bangkok, Thailand

Background:

Pain is a frequent and critical problem in daily hemodialysis practice. Local cold application before needle insertion is a simple, non-pharmacological method that may reduce pain through cutaneous analgesia. This study aimed to determine the optimal duration of cold pack application to minimize cannulation pain without increasing complications.

Methods:

A prospective crossover study was conducted in maintenance hemodialysis patients, each serving as their own control. Six sessions were performed sequentially: control (no intervention), followed by cold pack application for 1, 2, 3, 4, and 5 minutes before cannulation. Pain intensity was assessed using a numerical rating scale (0–10) immediately after the procedure (Figure 1). Statistical comparisons were performed using the Friedman test, with pairwise Wilcoxon signed-rank tests and Bonferroni correction. Local complications (erythema, bruising, prolonged bleeding) were monitored after each session.

Results:

A total of 31 patients completed all sessions. The median age was 62 years, with 52% male, and the proportion of AVF to AVG access was 26:5. Median pain scores progressively decreased with longer cold pack duration: control 8 (IQR 7–10), 1 minute 7 (5–8), 2 minutes 6 (5–8), 3 minutes 5 (4–6), 4 minutes 4 (3–5), and 5 minutes 3 (2–3). Pain reduction became statistically significant compared with control beginning at 2 minutes ($p < 0.001$), with the greatest reduction observed after 4–5 minutes of cooling (Figure 2). Pairwise contrasts confirmed significantly lower pain scores at 3–5 minutes compared with shorter durations. Three patients (10%) withdrew due to mild skin irritation after cooling, and no other local complications were observed.



Figure 1. Cold pack before needle cannulation

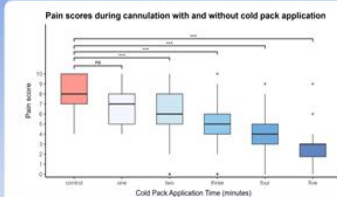


Figure 2. Pain scores during cannulation by cold pack duration. Pain decreased with longer cooling; significant reductions from ≥ 2 min ($*p < 0.001$)

Conclusions:

Pre-cannulation cold pack application for 3–4 minutes significantly reduces cannulation pain without increasing adverse effects. This simple, safe, and low-cost intervention can improve patient comfort during hemodialysis.

Effect of Dialyzer Reuse Number on Rinse Volume Required for Hydrogen Peroxide Clearance after Peracetic Acid Disinfection

Authors: Patcharin Injan, Salin Wattanatorn, Aschariya Wipattanakitcharoen, Paweena Susantitaphong, Khajohn Tiranathanagul, Pisut Katavetin, Kearkiat Praditpornsilpa, Kullaya Takkavatakarn
 Division of Nephrology, Department of Medicine, Faculty of Medicine, Chulalongkorn University and King Chulalongkorn Memorial Hospital, Bangkok, Thailand

Background:

Dialyzer reuse remains a common practice in emerging countries many hemodialysis centers to reduce cost and material waste. Dialyzers are disinfected using peracetic acid–based solutions before reuse. Inadequate rinsing may leave residual hydrogen peroxide, posing potential safety risks especially in patients undergoing online hemodiafiltration (OL-HDF). The optimal rinse volume required for complete peroxide clearance with increasing reuse numbers has not been clearly defined.

Methods:

We evaluated reused dialyzers at different reuse numbers to determine the cumulative rinse volume required to achieve a negative peroxide test at King Chulalongkorn Memorial Hospital, Thailand. Sequential rinsing with treated water was performed in increments of 3,500; 4,500; 5,500; 6,500; 7,500; 8,500; 9,500; and 10,000 mL, with residual peroxide measured after each step using standardized peroxide test strips. Segmented regression analysis was used to identify breakpoints in the relationship between the number of reuses and the rinse volume required for complete peroxide clearance.

Results:

A total of N dialyzers across 266 reuse cycles were examined. The median number of reuses was 9 (min-max: 1–19). The median cumulative rinse volume required to achieve a negative peroxide test was 5,500 mL (IQR 4,500–6,500 mL). Median rinse volume increased with higher reuse numbers: 1–5 reuses: 4,500 mL (IQR 4,250–4,500); 6–10: 5,500 mL (IQR 4,500–6,500); 11–15: 5,500 mL (IQR 5,500–6,500); and 16–20: 6,500 mL (IQR 5,500–7,500). A significant difference ($p < 0.05$) was observed between groups 1–5 and 6–10, and between groups 1–15 and 16–20 (Figure 1). Segmented regression revealed breakpoint around fifteen reuses, beyond which higher rinse volumes were required for peroxide clearance (Figure 2).

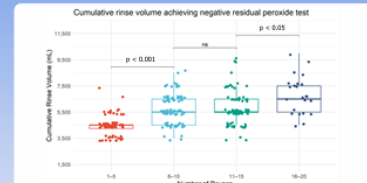


Figure 1. Cumulative rinse volume required for negative peroxide test across reuse groups. Median volume increased with higher reuses; significant differences were observed between 1–5 vs 6–10 ($p < 0.001$) and 11–15 vs 16–20 ($p < 0.05$).

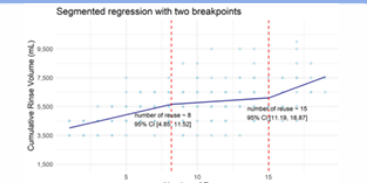


Figure 2. Segmented regression analysis showing two breakpoints in the relationship between dialyzer reuse number and rinse volume. Breakpoints were identified at approximately 8 reuses and 15 reuses.

Conclusions:

The number of dialyzer reuses significantly affects the rinse volume required for peroxide elimination after peracetic acid disinfection. Higher reuse numbers are associated with greater rinse volume requirements. Adjusting rinse protocols according to reuse frequency and limiting excessive reuse, particularly in OL-HDF may enhance patient safety and ensure effective reprocessing.

Writing Manuscript

Start with your own draft

Use AI to:

Refine language

Restructure content

Improve clarity and flow

**Always verify outputs
(human-in-the-loop)**



Writing Manuscript

Rewrite the paragraph to publication quality.

Requirements:

- Maintain original meaning (no new data)
- Improve clarity, conciseness, and academic tone
- Ensure clinically meaningful interpretation

Then:

1. Show the revised paragraph
2. Show the edits using tracked changes:
 - Bold = added words
 - [brackets] = removed words



Writing Manuscript

Hb control in HD patients is difficult and unstable. Many patients were not in the target range. Large ESA dose increases sometimes made Hb rise too fast and go above target.



Hb control in HD patients is [difficult and unstable] **remains challenging, with substantial variability.** Large ESA dose increases [sometimes made Hb rise too fast and go above target] **were associated with rapid hemoglobin rise and overshooting above the target range.**



Writing Manuscript

Introduction

Anemia is a common complication in patients receiving maintenance hemodialysis (HD) and is primarily treated with erythropoiesis-stimulating agents (ESAs). Current clinical guidelines recommend maintaining hemoglobin (Hb) levels within a target range of approximately 10–11.5 g/dL to reduce symptoms of anemia while minimizing the risks associated with higher Hb levels[1]. Achieving and maintaining this target range, however, remains challenging in routine clinical practice.

Ask AI, use @ to mention specific PDFs or / to access...

- Strengthen writing
 - ✦ Improve fluency >
 - 🔄 Paraphrase >
 - ✦ Simplify >
 - 📈 Strengthen argument
 - 🔄 Add a counter argument
- Transform
 - ☰ Convert to numbered list
 - ☰ Convert to prose
 - ☰ Convert to table
 - 🗣️ Translate >
 - Academic style
 - 📄 Increase formality
 - 👤 Technical precision
 - ↑ Increase claim confidence
 - ↓ Hedge claim confidence

- Paraphrase/rewrite
- **Adjust tone**
- **Improve academic style and clarity**




Writing Manuscript

Article

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KDIGO 2026 Clinical Practice Guideline for the Management of Anemia in Chronic Kidney Disease (CKD)

Tonelli, Berns, Bozkurt, Cheung, Cuevas, Effa, Eisenga, Fishban...

[Kidney International](#) · 2026

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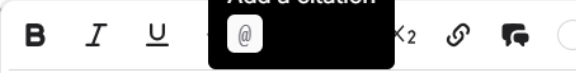



 OPEN ACCESS

Reconsideration of the anemia management strategy for chronic kidney disease and dialysis patients

Daimon

[Renal Replacement Therapy](#) · 2025

capacity to produce substantial erythropoietin (EPO) remains

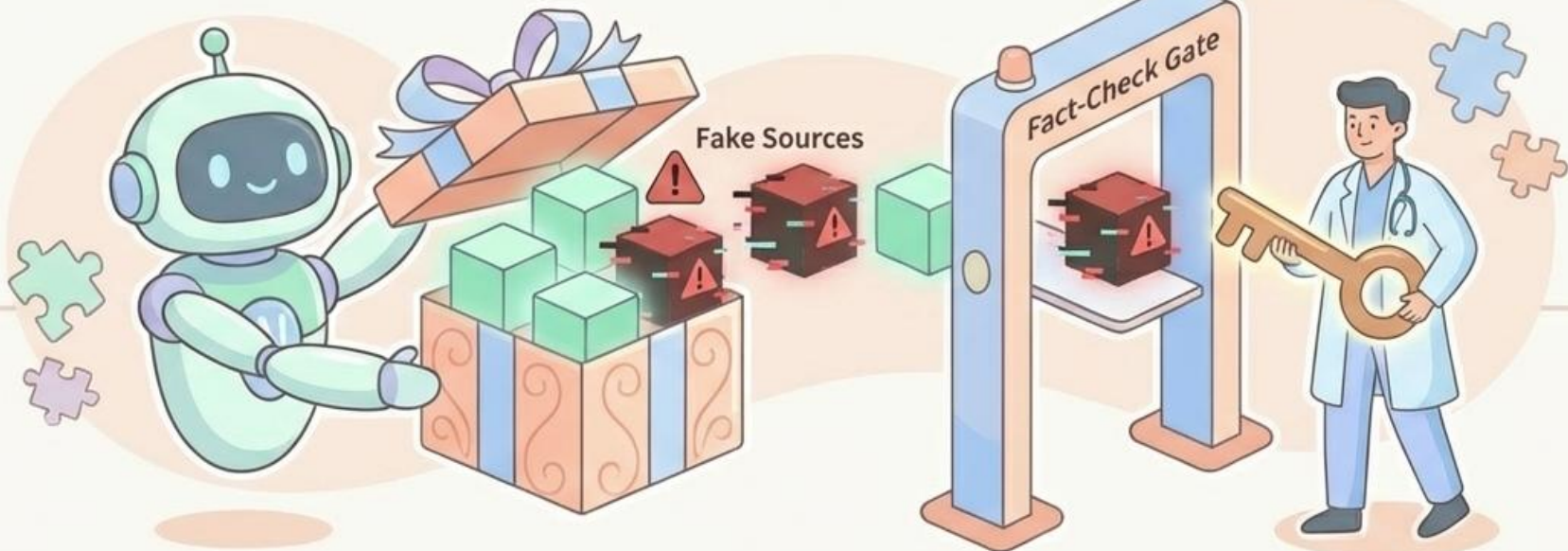

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@ Cite
Chat
AI Edit
Review
8 words

et range, however, remains challenging in routine

tients and has been associated with adverse
and mortality[2-4]. Several factors contribute to
us, intercurrent illness, and dialysis adequacy.
ose adjustments represents a key modifiable
-Hb instability.(Coutinho et al., 2025; Saglimbene

According to the 2026 KDIGO clinical practice guideline[1] for anemia in chronic kidney disease, ESA dose adjustments should generally not be made more frequently than every 2–4 weeks. In practice, Hb levels in HD patients are commonly measured monthly, and ESA doses





Hallucination

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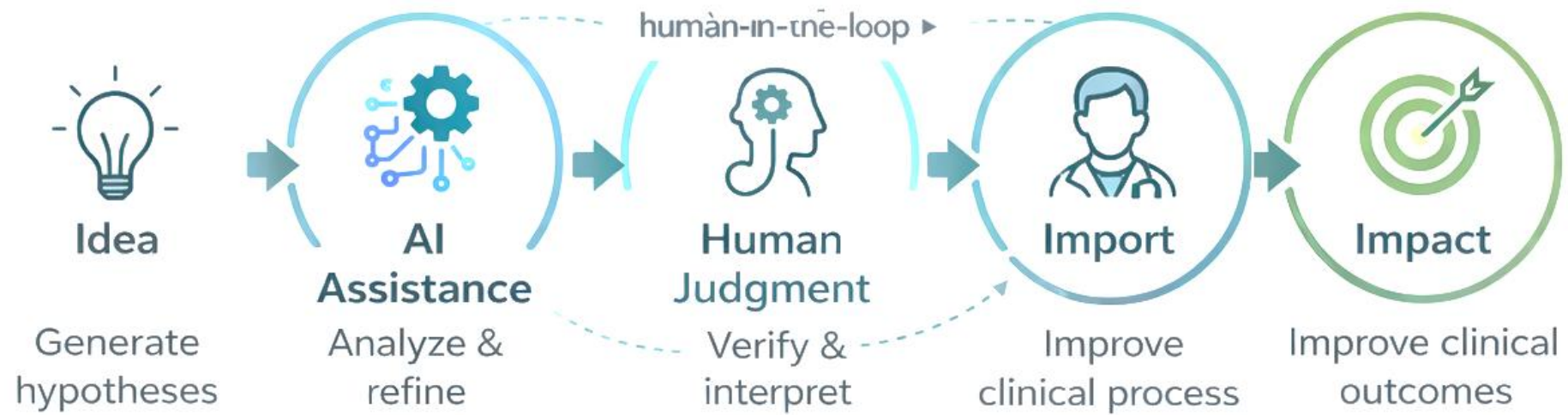
Fake sources

การสร้างแหล่งอ้างอิงที่ไม่มีอยู่จริง

Fact Check

มนุษย์ต้องเป็นผู้ตัดสินใจ
และตรวจสอบเสมอ





*The question is not whether to use AI,
but how to use it responsibly and effectively*



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