# Episode Book

EPISODE #5518

# Task-Based Organization: What ER Carts Teach Home Workshops

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## SYNOPSIS

A listener's email about a $30 small-parts box sent us down a research rabbit hole into emergency medicine. Task-based package organization (TPO) groups supplies by what they're for, not what they are — and neonatal resuscitation studies show dramatic retrieval-time wins. But a 2024 Vienna paramedic simulation found no overall benefit, and the old familiar kit beat the redesigned one. We dig into bedside supply carts, code cart redesigns at Cincinnati Children's, the 94% missed-item rate during intubation prep, and what home workshop organizers can actually steal from clinical practice.

# TRANSCRIPT



### Corn

Daniel's been on a bit of a crusade lately. Euro boxes, parts boxes, tipping panels, the whole modular storage religion. And his latest observation is that once you've got these systems in your house, you start seeing them everywhere.



### Herman

Which is true. Once you know what a linbin is, you can't walk into a hardware store without noticing them.



### Corn

So here's what he wrote in. He picked up a sixty-four tray small parts box a couple of months ago, and he's been assigning drawers to washers and screws and the like. Washer section organized by size, so when he needs a specific washer he just goes and gets it. He says it's been transformative, especially with all the small DIY projects involved in setting up a new apartment. Cumulative savings, reduction in friction, fewer stalled projects. All for a thirty-dollar piece of plastic and a few hours of careful labeling.



### Herman

That's the pitch. Thirty bucks and an afternoon.



### Corn

Then he's sitting in urgent care triage with Ezra. Stomach bug, chest infection, the usual rotation. And he looks around and notices the triage station has the same tip boxes and tray boxes he's been using, with a labeling system that looks like the one he set up himself. Which makes sense. If you're a triage nurse reaching for the same few supplies all day, blood draw vacutainers, glucose prick sticks, of course you'd build the same system. Different context, same philosophy. An industry decided that grabbing for supplies needs to be muscle memory so the person can stay focused on everything else.



### Herman

And then he asks the question.



### Corn

He asks how small parts are typically organized in urgent care, ER, and medical settings generally, where finding the right small thing has to be muscle memory for tired clinicians using the system continuously. He asks how paramedics kit out their quick-reach systems inside ambulances. He mentions he once saw a self-service ambulance restock station and was impressed by it. And then the two questions that are really the point: what specific failure modes has the medical setting addressed, and what best practices can we steal for other contexts?



### Herman

There's a lot in there. And the short version is that Daniel's home workshop system is a civilian version of a clinical discipline that has actual literature behind it.



### Corn

So where do we start?



### Herman

Start with the core insight. What Daniel built with his sixty-four trays is a version of what the medical world calls task-based package organization, or TPO. And the distinction that matters is this. Traditional emergency kits are organized by material type. All the syringes together, all the medications together, all the airway stuff together. Or they're organized by the ABC framework, airway, breathing, circulation. The problem with both is that assembling equipment for one procedure forces you to pull from several different drawers or bags. You're doing a scavenger hunt every time.



### Corn

Which is fine if you've got time and a clear head.



### Herman

Right. But the person reaching for the supply is tired, the stakes are high, and the cost of not finding something is measured in seconds that matter. TPO flips the organizing principle. Instead of grouping by what the thing is, you group by what the thing is for. Everything needed for one task goes into one module. No extraneous items. The goal is to reduce working-memory load, because working memory is the thing that fails first when you're stressed and sleep-deprived.



**Corn**

So Daniel's washer section organized by size is material-based.



**Herman**

It is. And that's fine for a home workshop where you've got time. But the clinical lesson is that you should also group by job. Not just "all the washers" but "everything for hanging a picture" in one tray.



**Corn**

Let's look at what the evidence actually says about whether this works.



**Herman**

The strongest evidence comes from a neonatal study published in Frontiers in Pediatrics in twenty twenty-one. They compared a task-based package-organized emergency backpack against the classical setup for neonatal resuscitation. Intraosseous access retrieval dropped from seventy-five seconds to thirty-three seconds. Intubation prep went from seventy seconds to fifty-three. Adrenaline retrieval went from forty-five seconds to twenty-two. All of those are statistically significant.



**Corn**

Those are big numbers.



**Herman**

And it wasn't just speed. Missing items dropped too. For intraosseous access, the classical kit averaged two point three missing items. The TPO kit averaged zero point nine. For adrenaline, it was one missing item versus zero point zero four. And the subjective score for clearness of arrangement was five point nine out of six versus three point five.



**Corn**

So the clinicians could actually see what they were doing.



**Herman**

That's the part people underestimate. It's not just about speed. It's about whether the person can find the thing at all.



**Corn**

But there's counter-evidence.



**Herman**

There is, and it's important. A twenty twenty-four study in the Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine ran a prehospital simulation with eighty Vienna paramedics. They compared a novel TPO backpack against a novel non-TPO backpack. And they found no overall difference. Seventy-three seconds versus sixty-four seconds, p equals zero point one one. Not significant.



**Corn**

So TPO didn't win.



**Herman**

TPO didn't win overall. And here's the part that should make anyone reorganizing their workshop stop and think. The kit that was already in service, the old familiar one, was fastest at fifty-four seconds. Familiarity beat design. The paramedics knew where everything was in the kit they'd been using for years, and a theoretically better layout couldn't overcome that.



**Corn**

What did TPO win on?



**Herman**

Only the forearm-splint task. Forty-nine seconds versus thirty-two, p less than zero point zero zero one. And there's one more finding from that study that's worth sitting with. Ninety-four percent of paramedics missed at least one item during intubation prep, regardless of which kit they were using.



**Corn**

Ninety-four percent.



**Herman**

Regardless of kit type. Which tells you that the problem isn't entirely solvable by layout. Human beings under stress miss things. The question is whether the system catches the miss or compounds it.



**Corn**

So the evidence is contested.



**Herman**

It is. In-hospital and neonatal studies show large wins. The one prehospital paramedic simulation found no overall benefit. This is a real disagreement in the literature, not a settled finding. And that's actually useful, because it tells us the answer depends on context.



**Corn**

What's different about the prehospital setting?



**Herman**

Predictability, probably. In a neonatal resuscitation, the tasks are highly standardized. You know what you're going to need and in what order. In the back of an ambulance, you're dealing with whatever shows up. The task set is broader and less predictable. TPO works best when the task is well-defined and the kit is unfamiliar. When the task is variable and



### Herman (continued)

the kit is familiar, the advantage shrinks.



### Corn

Let's talk about the in-hospital evidence, because that's closer to Daniel's tray boxes.



### Herman

The closest analogue is the bedside supply cart. There's a twenty twenty-six study in JMIR Human Factors that looked at a five-drawer Harloff cart in an emergency department. And what they found was that high-frequency items were underrepresented and low-frequency items were overrepresented.



### Corn

Meaning the cart was stocked wrong.



### Herman

The cart was stocked by what someone thought would be needed, not by what was actually grabbed. So the stuff nurses reached for constantly was running out, and the stuff nobody touched was taking up space and expiring. They redesigned it, and supply acquisition got about twenty percent faster. Availability of key supplies tripled. And restocking went from once per shift to once per three shifts.



### Corn

That's a staffing win.



### Herman

It is. IV start kit capacity went from two or three per cart to nine. That's a two hundred percent increase. Heplocks up seventy-five percent. Vacutainers up a hundred and twenty-five percent. Flushes up a hundred percent. And here's the detail I find most interesting. The time saved grew the longer the cart went un-restocked. One point five seconds saved on shift one. Four point seven seconds on shift two. Eleven point three



**Herman (continued)**

seconds on shift three.



**Corn**

Because a properly stocked cart stays properly stocked.



**Herman**

Because the failure pattern compounds. A cart that's missing things forces workarounds, and workarounds create more mess.



**Corn**

What were the nurses saying?



**Herman**

The quotes are brutal. One nurse said, "I can't leave a seizing patient to go look for oxygen masks because my cart didn't have any." Another said, "I run from cart to cart all day, then say forget it, I'm just going to the stockroom." And a third: "A lot of things in the cart are rarely used. They're a waste of space. When there are things in the cart that aren't used, they expire and we have to throw them out."



**Corn**

The stockroom run is the tell.



**Herman**

It's the moment the system has failed and the person has given up on it. And that happens in home workshops too. You've got a bin for something, but you can't find it, so you go buy another one. Or you leave the project and come back to it later, which means it doesn't get finished.



**Corn**

What about code carts?



**Herman**

Code carts are the crash carts, the ones that get wheeled in when someone's coding. Cincinnati Children's did a redesign combining Lean methodology with human factors principles, published in Pediatric Quality and Safety in twenty twenty-three. Intraosseous equipment retrieval dropped from forty-six point four seconds to twenty-three point nine. And staff grabbing the wrong item or opening the wrong drawer fell sharply. Seventy-eight percent reported zero or one errors after the redesign, versus thirty-two percent before.



**Corn**

That's a huge shift.



**Herman**

And the cost angle is real. Restocking cost fell by eight hundred seventy-eight dollars and eighty-nine cents per full restock. Across a hundred and ten carts, that's over ninety-six thousand dollars in savings.



**Corn**

What did they actually change?



**Herman**

Several specific things. They color-coded drawers by role. Respiratory drawers blue, nursing drawers red. They put all supplies for one task in a single drawer. So everything for intubation in one place, not spread across three drawers. They put most-used items on the left of each drawer, because that's where the hand goes first.



**Corn**

The leftmost thing is the thing you grab without thinking.



**Herman**

They laid medication boxes flat and used what they called spice racks so the vial labels were readable. Instead of a box of vials where you have to pick it up and turn it to see what it is, the labels face up. And they moved a premade push-pull bolus kit into the drawer where nurses would look for it, rather than where the pharmacy thought it should go.



**Corn**

That last one is interesting. It's about matching the system to the user's mental model, not the designer's.



**Herman**

That's the whole game. The system has to match where the person's hand is already going, not where you think it should go.



**Corn**

So what are the failure pattern these systems are addressing?



**Herman**

Understocking high-frequency items. Overstocking rare items that expire. Workarounds, which means personal stash buckets and hiding supplies so you can find them later. And the big one: no one has time to restock. The system degrades because maintaining it is nobody's priority until it fails.



**Corn**

That's the same in a home workshop.



**Herman**

Identical. You buy the tray box, you label everything, and then you use it. And over time, things don't get put back. Or you buy a new pack of screws and don't have a place for them, so they go on the bench. And six months later the system is half-broken.



**Corn**

There's a 5S study too.



**Herman**

Yang and colleagues, published in Quality Management in Health Care in twenty twenty-five. They applied 5S to an ED observation room. 5S is the Lean methodology. Sort, set in order, shine, standardize, sustain. Unfinished nursing care dropped from seventy-three point four percent to thirty-nine point six percent. Overtime dropped from thirty-seven point two minutes to fourteen point one minutes.



**Corn**

Unfinished care.



**Herman**

The stuff that doesn't get done because the nurse is hunting for supplies instead of providing care. And that's the real cost. Not the seconds, but the care that doesn't happen because the system is fighting the person.



**Corn**

So that's the in-hospital evidence. What about the back of an ambulance?



**Herman**

Paramedics carry somewhere between a hundred and two hundred different items in what they call jump bags. And the traditional design was one large compartment with items seldom clearly labeled. Which impedes rapid access and contributes to medication-selection errors.



**Corn**

A hundred to two hundred items in one bag.



**Herman**

In one bag. And if you can't see the labels, you're guessing. There was a redesign in Northumberland County in Ontario, published in Applied Ergonomics in twenty nineteen. They found that sixty-two percent of paramedics believed equipment was easier to find in the new bag, and sixty-five percent preferred it overall.



**Corn**

What does modern EMS bag doctrine look like?



**Herman**

It maps gear placement to patient assessment algorithms. So either ABC, airway, breathing, circulation, or MARCH, which is massive hemorrhage, airway, respiration, circulation, head. The idea is that the order you reach for things matches the order you assess the patient. First-needed items like gloves, bandages, airway adjuncts go in the top or most accessible layers. You group by function into sub-packs. Bulk items and advanced items go at the bottom.



**Corn**

So the bag is a physical representation of the assessment sequence.



**Herman**

The bag teaches you the algorithm by how it's laid out.



**Corn**

What about the commercial products?



**Herman**

The R and B Z PAK trauma bag insert unfolds into a wall of labeled see-through pockets. Eighteen inches by thirty-four inches of working surface. You open the bag and it becomes a display. And the RB-S400X intubation module is explicitly marketed as a standardized, removable sub-load designed to reduce cognitive load and decrease time-to-intervention by pre-organizing all necessary tools into a predictable, muscle-memory based layout.



**Corn**

That's the marketing copy.



**Herman**

That's their pitch. And it's the same pitch as the code cart redesign. Pre-organize so the person doesn't have to think.



**Corn**

What about standardization across vehicles?



**Herman**

The Irish Red Cross publishes a National Ambulance Layout Standard so equipment placement is identical fleet-wide. That makes audits easier, stock-takes easier, and cross-unit working easier. If you transfer to a different station, the ambulance is laid out the same way. Ontario publishes Provincial Equipment Standards for Ambulance Services specifying minimum quantities. But there's no single canonical global standard. Standards are national or provincial.



**Corn**

Which means there's variation.



**Herman**

There's variation. And that's an open question. What would a universal standard look like, and would it help or hurt? Standardization makes systems predictable, but it also makes them rigid. If the standard is wrong, everyone's wrong together.



**Corn**

Let's get to the transferable lessons, because that's what Daniel's really asking.



**Herman**

The first one is that familiarity beats cleverness. The Vienna study's fastest kit was the old familiar one. A better system you haven't internalized can be slower than the messy one you know. So if you're reorganizing your workshop, expect to be slower for a while. The system has to become invisible before it becomes faster.



**Corn**

Which means you have to commit to it.



**Herman**

You have to commit to it and use it. The second lesson is group by job, not just by material. Daniel's washer section organized by size is material-based. The clinical lesson is to also group by task. Everything for hanging a picture in one tray. Everything for assembling a flat-pack in another. The material organization is for restocking. The task organization is for doing.



**Corn**

Both have a place.



**Herman**

But if you only have one, the task-based grouping is the one that saves time when you're actually working.



**Corn**

Third lesson?



**Herman**

Frequency-weighted placement. Most-used items highest and leftmost. The thing you reach for most often should be the thing that's easiest to reach. And the thing you reach for least often can be at the back or the bottom.



**Corn**

Fourth?



**Herman**

Labeling as a cognitive aid. Photo labels at the bottom of each compartment. Drawer-content labels. Kit dump sheets. These are designed to let a novice perform like an expert and to prevent drift over time. Because systems drift. Things get put back in the wrong place. Labels get peeled off. The system degrades unless there's something that pulls it back.



**Corn**

Photos specifically?



**Herman**

Photos specifically. Because a photo of a washer is faster to recognize than the word "washer." And a photo of the washer on the bolt is faster still, because it shows the thing in use, not the thing in storage.



**Corn**

That's a good distinction.



**Herman**

It's the distinction between recognizing an object and recognizing a task. The brain is faster at the second one.



**Corn**

Fifth lesson?



**Herman**

Size compartments to fit the item. Stock enough for a full shift, or in a home context, a full project. And label with photos. The ED fix maps directly onto home tray boxes. The question is whether the home user has the discipline to sustain the system without the institutional pressure of a code cart audit.



**Corn**

That's the hard part.



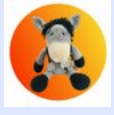
**Herman**

In a hospital, someone audits the cart. There's a checklist. There's a regulatory requirement. At home, nobody's checking. The system works until it doesn't, and then you're back to the stockroom run.



**Corn**

So what does the contested evidence mean for transferability?



**Herman**

It means the answer is probably that TPO works best when the task is predictable and the kit is unfamiliar. Familiarity and standardization may matter more than the specific organizational scheme. Which is a caution for anyone who thinks a better layout will automatically be faster. It won't, until you've internalized it.



**Corn**

And the failure pattern are universal.



**Herman**

Universal. Understocking, overstocking rare items, expired stock, workarounds, and no one has time to restock. Those appear identically in EDs and home workshops. The ED fix is to size compartments to fit the item, stock enough for a full shift, and label with photos. That maps directly onto home tray boxes.



**Corn**

So the question is whether the home user has the discipline to sustain the system.



**Herman**

Without the institutional pressure. That's the open question.



**Hilbert**

The label should be a picture you recognize at a glance.



**Corn**

Sorry, what?



**Hilbert**

I worked as a stagehand at a regional theater for a while. The props department had a system for organizing small parts. Buttons, snaps, fake jewels, tiny screws for set pieces. And it was essentially the same as a code cart. The props master called it the show kit. It was organized by scene, not by material type. Everything for one scene's quick-change was in one tray, labeled with a Polaroid of the actor in that costume.



**Herman**

So the label was a face.



**Hilbert**

The label was a face. And the props master had a rule. If you have to read the label, the label is wrong. The label should be a picture you recognize at a glance. Your brain recognizes faces faster than words. And it recognizes a thing in use faster than a thing in storage.



**Corn**

So it's not muscle memory in the hands.



**Hilbert**

It's the eyes. The hands follow. But the recognition happens in the eyes. A photo of a washer is fine. A photo of the washer on the bolt is better. Because you're not looking for a washer. You're looking for the thing you're about to do with it.



**Herman**

That connects to the spice racks in the code cart redesign.



**Hilbert**

It does. The medication boxes laid flat so the vial labels are readable. That's the same principle. You're not picking up the box to see what's inside. You're seeing what's inside without picking it up. The label does the work.



**Corn**

So the best label is one you don't have to read.



**Hilbert**

The best label is one you don't have to read. The props master had a file cabinet full of Polaroids. Every actor, every costume, every scene. And when a quick-change happened, you didn't look up the scene number. You looked for the face.



**Herman**

And that's why the neonatal study scored clearness of arrangement at five point nine out of six.



**Hilbert**

Because the arrangement was clear. You could see it. You didn't have to decode it. That's the whole thing. The system should be visible, not legible.



**Corn**

Visible, not legible.



**Hilbert**

I've got to move some things before it gets dark. The weather's turning.



**Corn**

So the TPO evidence is contested. In-hospital and neonatal studies show large wins, but the prehospital paramedic simulation found no overall benefit. Is the difference the setting, the familiarity, or the task predictability?



**Herman**

That's the open question. And there's no single canonical global standard for ambulance layout. Standards are national or provincial. What would a universal standard look like, and would it help or hurt?



**Corn**

The failure pattern are universal, though. Understocking, overstocking rare items, expired stock, workarounds, and no one has time to restock. Those appear identically in EDs and home workshops. The ED fix maps directly onto home tray boxes. The question is whether the home user has the discipline to sustain the system without the institutional pressure of a code cart audit.



**Herman**

Which is the real transferable lesson. The system works if you maintain it. And maintenance is the hard part.



**Corn**

If you're enjoying the show, leave a review. It helps other listeners find us.



**Herman**

Thanks to our producer, Hilbert Flumingtop.



**Corn**

This has been My Weird Prompts.



**Herman**

We'll be back soon.