RESEARCH REPORT

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Everyday Management of Transdermal Menopausal Hormone Therapy

AN INDUSTRIAL DESIGN INVESTIGATION

EXECUTIVE SUMMARY

Menopausal hormone therapy (MHT) is a well-established method of treating menopausal symptoms, but the practical effort involved in maintaining the treatment in daily life has been less thoroughly described than its clinical application. This industrial design study looked at how prescribed transdermal MHT is understood, remembered, collected, applied, stored, carried and continued as routines and environments change.

The research combined secondary literature, market benchmarking, a descriptive survey of 26 valid respondents, and five semi-structured interviews with three users of MHT, one women's-health general practitioner and one compounding pharmacist. The interview analysis began with coding at the individual-participant level. This culminated in 172 final coding units, 68 resolved subcodes, 12 parent categories and six interpretive themes. The findings were then combined with the survey results to produce four higher-level mixed-method findings.

First, the treatment is maintained by regularity, but changes to this routine reveal its fragility. The survey showed that users had taken the treatment later than they intended, were uncertain as to whether they had already taken it or had forgotten, and were unsure if they were adhering to their routine. Second, the users take on responsibility for their treatment without having the necessary level of certainty. Of those using gel or cream, most were uncertain about absorption, some of which were uncertain about the amount intended to be dispensed; among patch users, there was also uncertainty as to having received the correct hormone dose. Third, the transdermal treatment is managed through the body and the surrounding environment, since drying, residue, clothing, skincare, heat and transfer to other people all become part of the interaction. Finally, continuity goes beyond the act of applying the treatment to include travel, storage, supply and access. Most users had travelled while on the treatment and experienced some difficulty with refills.

The results do not indicate that transdermal MHT is in all cases difficult. On the contrary, modest interaction requirements become more important whenever there are changes in routines, environments, the way the treatment is delivered or the conditions under which it is supplied. The industrial design opportunity is therefore greater than that of simply redesigning the cosmetic packaging; it consists in creating a treatment-management experience which makes the various legitimate states of the product clearer, lowers the amount of unnecessary handling, promotes portability and continuity, and maintains the flexibility that is led by the clinician, without attempting to measure physiological absorption.

AUTHENTICITY STATEMENT

This is to certify that to the best of my knowledge, the content of this report is my own work. This report has not been submitted for any subject or for other purposes. I certify that the intellectual content of this report is the product of my own work and that all the assistance received in preparing this report and sources have been acknowledged.

Your name: Ada McKie

Date: 07/09/2026

AI USE STATEMENT

I have utilised Generative AI in this report (ChatGPT) to assist in various ways. The way I have used ChatGPT includes: Reducing word count and editing words as a way to clarify intent of the writing - Section Three and Design Implications. Genio Notes was used to assist in transcribing interview audio.

Your name: Ada McKie

Date: 07/09/2026

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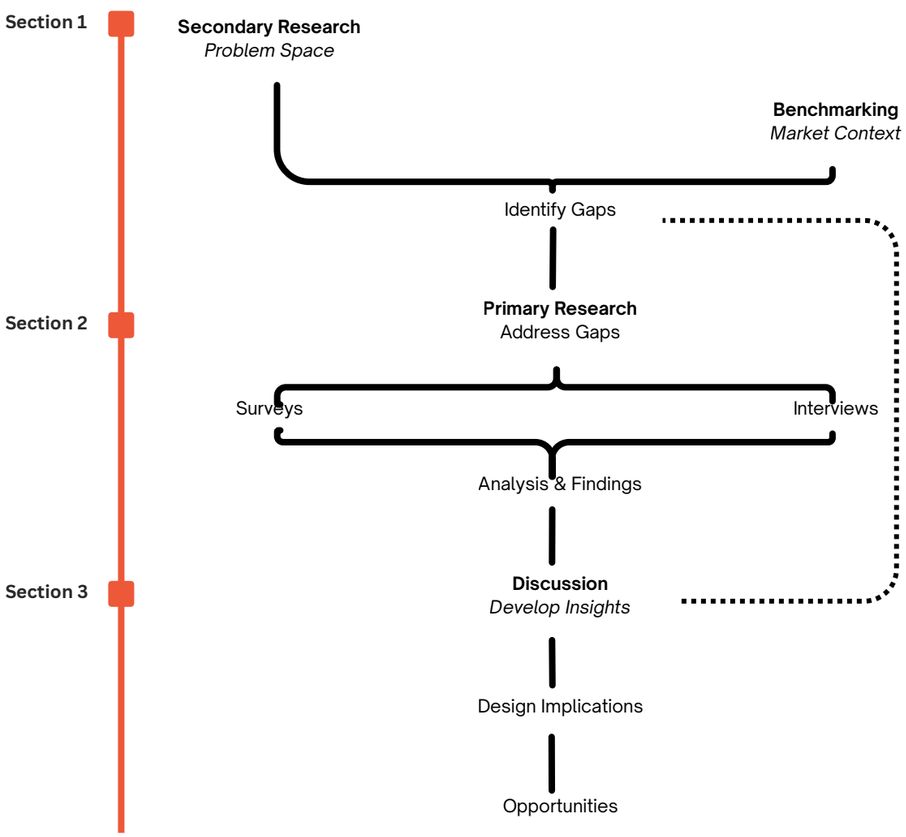
01 INTRODUCTION

Hormone Replacement Therapy (HRT) is a trusted and growing option for many women. The decision to start therapy usually stems from persistent, difficult menopausal symptoms and is guided by clinical advice (Harper-Harrison et al., 2026; Santoro et al., 2021). But juggling clinical suitability, doctor advice and new medical considerations is only the beginning of most women's menopause care journey. Women also have to remember, manage, apply, store, carry, replace, and fit transdermal products into the reality of their daily lives.

This project examines the gap between the clinical scope of prescribed transdermal MHT and the practical management required to sustain it across women's day-to-day routines. It seeks to question circumstances in which treatment interactions generate uncertainty, additional workload, or necessitate adaptation, and to use these insights to inform specific industrial design opportunities:

"How do women physically and emotionally navigate the everyday management of transdermal menopausal hormone therapy across application, storage, routine disruption and treatment change?"

FIGURE 1: PROJECT PHASE STRUCTURE





02 BACKGROUND

MHT is not a single, standardised product experience; the current guidelines indicate that either oral or transdermal formulations are appropriate depending on the patient's clinical history, symptoms, treatment objectives, and personal preference rather than there being one route that is universally better (Lumsden et al., 2025; Magraith & Jang, 2023; Panay et al., 2025).

In the field of industrial design, this is important since it is not sufficient to assume that a user will switch to a different formulation. A prescribed therapy might already be the one that is clinically appropriate or personally preferred. The design challenge then consists in respecting that particular treatment while looking at the interaction associated with it.

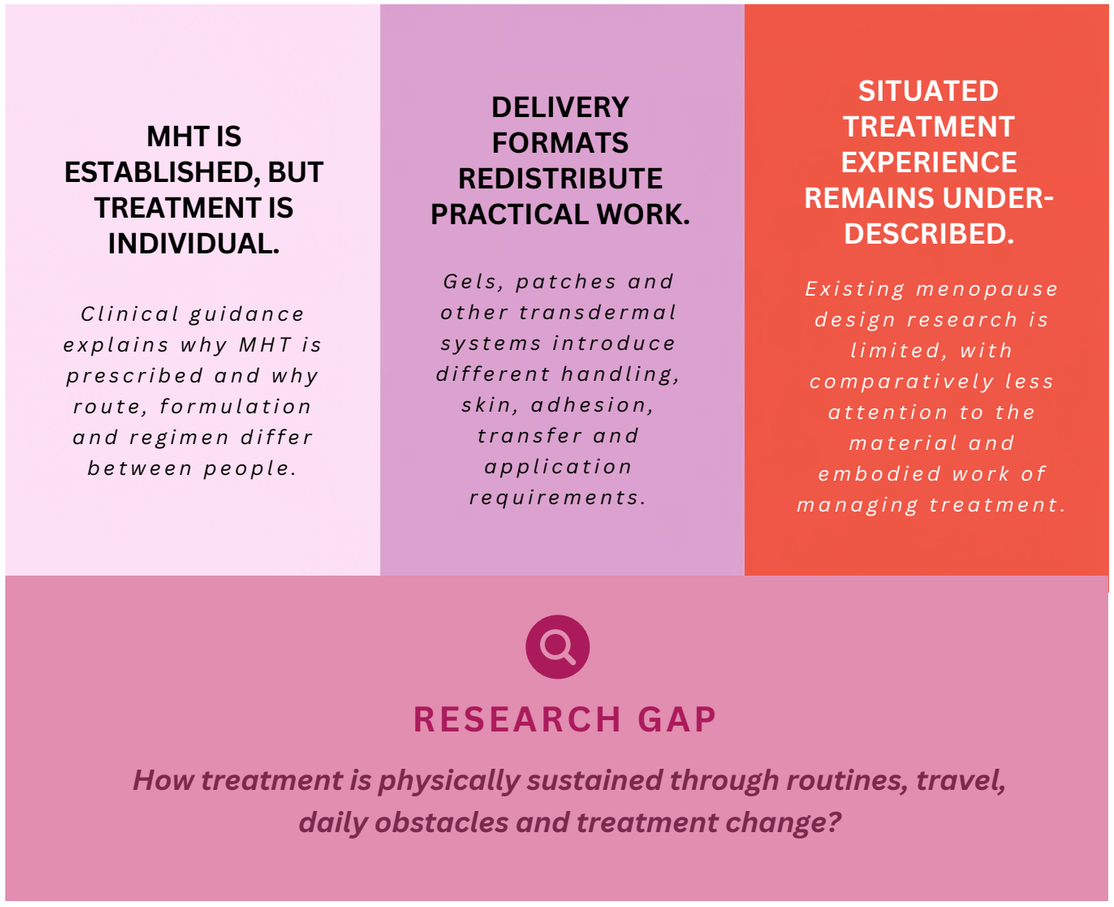
The various formats of MHT have different effects in terms of practicality. The clinical and drug-delivery literature makes a distinction between oral and transdermal routes and between patches and topical systems, regarding adhesion, skin interaction, transfer, dosing flexibility and application requirements (Goldštajn et al., 2022; Bostani Khalesi et al., 2025; Mihai et al., 2026).

These technical features then turn into routine actions. A person using a gel will count the number of times the pump is actuated, spread the product onto the skin, wait for it to dry and then wash their hands. Someone using a patch will keep an eye on the adhesion, any skin reaction and the time at which it needs replacing. When a regimen involves more than one product, it will be necessary to coordinate the different formats, schedules and methods of supply.

Thus the appropriate design question is not which route is clinically "best", but rather how the one chosen expresses its state, fits in to normal practice and can still be used in different situations.

Another aspect of the evidence relates to access, information and care. Current research points out difficulties in seeking help, a lack of knowledge about treatment, insufficient confidence among professionals and problems with referral routes, while the literature from Australia shows that there are still gaps in the care and access to menopause services (Barber & Charles, 2023; Davis & Magraith, 2023; Thavabalan et al., 2025).

FIGURE 2: RESEARCH GAP & OVERVIEW



There is also a similar gap in this area. According to Moline and Clerke's (2023) scoping review, design research focused on menopause is limited and advocates for more attention to be paid to socially situated experiences rather than mainly to medical or digital approaches.

These sources together show an gap in industrial design: the practical and organisational work needed to ensure that treatment as prescribed by doctors continues to function in real-life situations is still comparatively under-described. Existing MHT research explains clinical treatment options, but provides less detail about how prescribed products are managed in everyday life. This project investigates the practical work involved in application, routines, storage, travel and supply, and how industrial design could better support these activities.

The product is just one element of the entire process; the user has to understand the prescription, get the treatment, learn about the interaction, incorporate it into their daily routine, keep an eye on their supply and at times change the formulation. If there is any difficulty at any of these stages it can affect the user's experience of the physical product.

03 BENCHMARKING

The benchmarking examined existing MHT delivery formats alongside related monitoring and support products. Direct benchmarks were compared to understand the practical demands of administering prescribed treatment. Adjacent benchmarks were included to explore approaches to feedback, personalisation and routine support.

Treatment efficacy and clinical suitability remain essential considerations. However, this comparison evaluates interaction characteristics rather than clinical effectiveness. The products and services are not therapeutically equivalent, and the scores should not be interpreted as recommendations for treatment.

Nine criteria guided the comparison: dose or state certainty, feedback, routine compatibility, handling simplicity, portability, discretion, transfer and contamination control, adaptability, and continuity. Scores from 1 to 5 represent researcher-assigned design judgements using the framework in Appendix F. They describe relative strengths and limitations within the selected benchmark set rather than validated measures of performance.

Current formats for the delivery of MHT

The comparison based on the benchmark showed the different trade-offs involved in interaction rather than identifying one format as the best performing (see Table 1).

The gel pump designed for titration according to prescription is quite adaptable but requires repeated pumping, spreading, drying, and careful handling to avoid residue. The use of unit-dose sachets makes the amount to be administered more clear and enhances portability, although it still involves the physical demands of topical application. Patches eliminate the need for repeated handling and offer good containment as well as portability, but they do raise other problems relating to skin interaction, replacement and the relatively limited feedback that the user can observe.

Although oral and multi-product regimens are easy to carry and administer physically, the complexity shifts to remembering schedules and coordinating the various treatment components. The key result within the interaction framework is therefore that one route does not as a whole outperform another; rather, each architecture deals with certainty, effort, adaptability and continuity in a different way.

Examples of MHT delivery profiles

The following four types of architecture were selected for more detailed comparison: metered gel, unit-dose gel, transdermal patch and oral oestrogen combined with cyclic progesterone (see figure 3). The gel pump's main advantage, adaptability, is offset by relatively poor handling, portability, containment and feedback. Although the sachet provides better dose clarity and improves portability, it still has the characteristics of topical spreading and drying. The patch does well in terms of everyday fit and containment, while the oral regimen makes physical handling easier but still requires temporal coordination and memory.

SECTION 1 The Topic

Adjacent innovation profiles

The adjacent benchmarks illustrate different ways of providing information or support around health management. Their relevance lies in their interaction design rather than their ability to deliver MHT. Peri represents wearable monitoring focused on the menopause experience.

Oura illustrates how physiological information can be collected through a wearable and presented through an app. Mira uses active home hormone testing, introducing sampling, consumables and additional interpretation. Embr Wave provides user-controlled warming or cooling sensations through a wearable device.

These examples highlight approaches to feedback, personalisation and routine integration. However, additional information can also introduce extra tasks. The opportunity for this project is to provide useful feedback within the treatment interaction while keeping the physical and cognitive demands manageable.

FIGURE 3: PROFILES OF VARIOUS MHT DELIVERY FORMATS

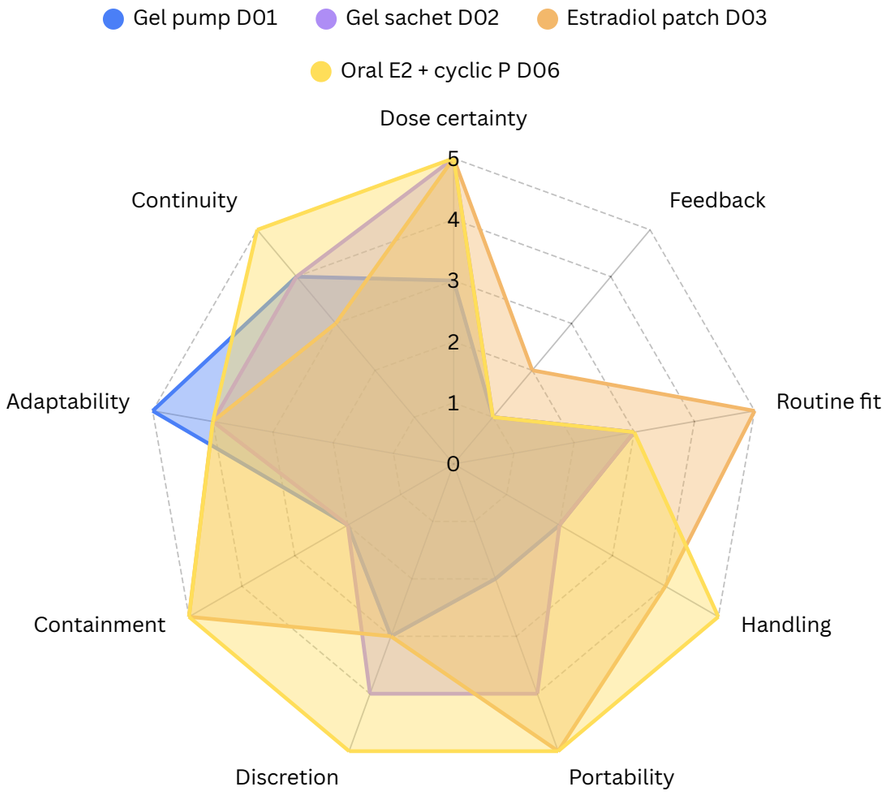


FIGURE 4: ADJACENT INNOVATION PROFILES

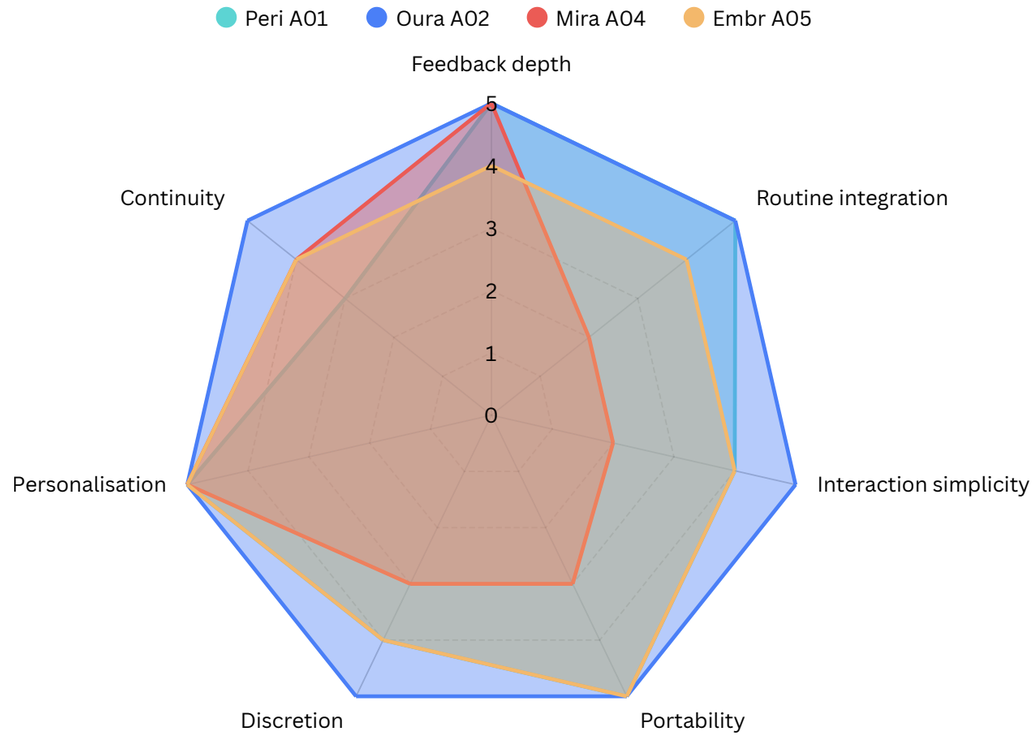


TABLE 1: BENCHMARK HEATMAP (VARIOUS MHT FORMATS)

Transdermal format	Dose or state certainty	Feedback	Routine fit	Handling	Portability	Discretion	Transfer control	Adaptability	Continuity
Gel pump	3	1	3	2	2	3	2	5	4
Gel sachet	5	1	3	2	4	4	2	4	4
Oestrogen patch	5	2	5	4	5	3	5	4	3
Sequential patch	5	2	3	3	5	3	5	2	4

03 BENCHMARKING

Adjacent innovation profiles

Other innovations concerning menopause deal with a different issue; the value these have for this project is not in the delivery of hormones but in the way they make previously invisible states easier to understand (see figure 4).

Peri offers a structured approach to monitoring and personalising menopause care. Oura illustrates how passive sensing and ongoing feedback can be combined with only a small amount of repeated input from the user. Mira delivers detailed quantitative data via active hormone testing, but this involves extra sampling, the need for consumables, hardware, and interactions with the app. Embr Wave also provides a physical example of immediate, user-perceivable intervention and control.

The qualities that are most easily applied in these cases are feedback, routine integration, portability, personalisation and continuity. It is important to note that more abundant information does not automatically result in a lower interaction burden. Thus, an opportunity lies in allowing MHT users to gain a clearer undertsanding of how useful treatment states could be without having to create another demanding interaction.

Strategic opportunity

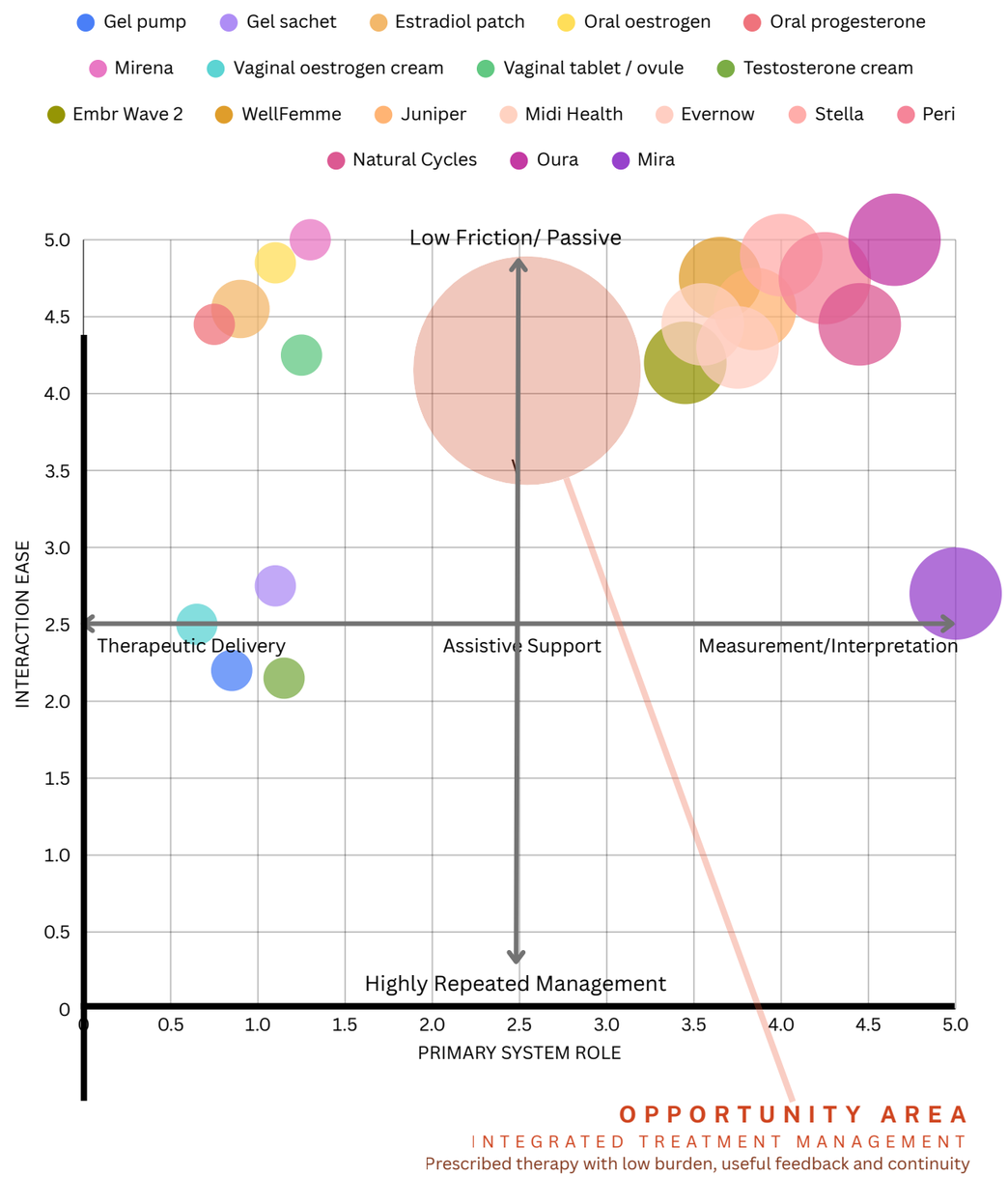
Within the selected benchmarks, medicine-delivery products primarily support administration, while adjacent products provide monitoring, interpretation or symptom support. This suggests an opportunity to investigate whether useful feedback can be integrated more closely with the physical management of prescribed treatment.

The highlighted area in Figure 5 represents a potential design direction: treatment support that combines low interaction effort with clear information about dispensing, timing and remaining supply. Its empty position does not establish that no relevant products exist. It reflects the selection and scoring of products included in this study.

The map is exploratory. Product positions represent researcher-assigned judgements about system role and interaction ease, while bubble size represents the feedback score. The detailed scoring framework is provided in Appendix F.

This comparison informed three questions for primary research: which treatment states are difficult to verify, which interactions create avoidable effort, and what helps users maintain treatment when routines or circumstances change?

FIGURE 5: OPPORTUNITY MAPPING



Various products were grouped and ranked (see Appendix for specific brands) against their primary system role in menopause and MHT care (Therapeutic Delivery - Active Measurement) and Interaction ease (Low-friction - High repeated management). And User feedback as the bubble size (C2 score)

04 RESEARCH

A combination of descriptive and methodological approaches was employed in order to progress from general secondary evidence to a detailed understanding of the treatment experience (see figure 6).

The analysis made use of data from a quantitative survey to spot patterns that occurred within the sample, while the semi-structured interviews looked into how those patterns were experienced, understood and managed. This approach was suitable since the survey data give a broad overview whereas the interviews offer context regarding routine, the environment, adaptation and meaning.

Survey

The survey yielded an initial total of twenty-seven submissions. A duplicate or test response that had been confirmed by a researcher was excluded, which left an analytical sample of n = 26. Responses with missing data were kept as missing rather than being imputed, and the conditional questions were analysed with the relevant subgroup denominator. The survey covered: treatment format; application; routine management; storage; supply; travel; overall practical experience. The results are given in a descriptive manner and no claim is made regarding statistical significance, causal inference or the ability to generalise to a population.

Interviews

The deeper contextual evidence was obtained from five semi-structured interviews. Three people provided a lived account of their experience with MHT. Two of the participants who were professionals gave differing views from each system: one women's-health GP; one compounding pharmacist. The user interviews looked at routine, confidence regarding the dose, application, storage, travel, privacy, the surrounding environment and workarounds, while the professional interviews looked into understanding of the treatment, dispensing, personalisation, availability, communication and the transitions between treatments. The statements made by professionals are considered to reflect the participants' viewpoints and are not regarded as independently verified medical facts unless they are supported elsewhere.

Qualitative analysis

Each interview was initially open-coded separately to preserve the participant's language and context. Codes describing similar experiences were then compared across interviews. Overlapping labels were reviewed by meaning and organised into a shared framework of 68 resolved subcodes, 12 parent categories and six interpretive themes.

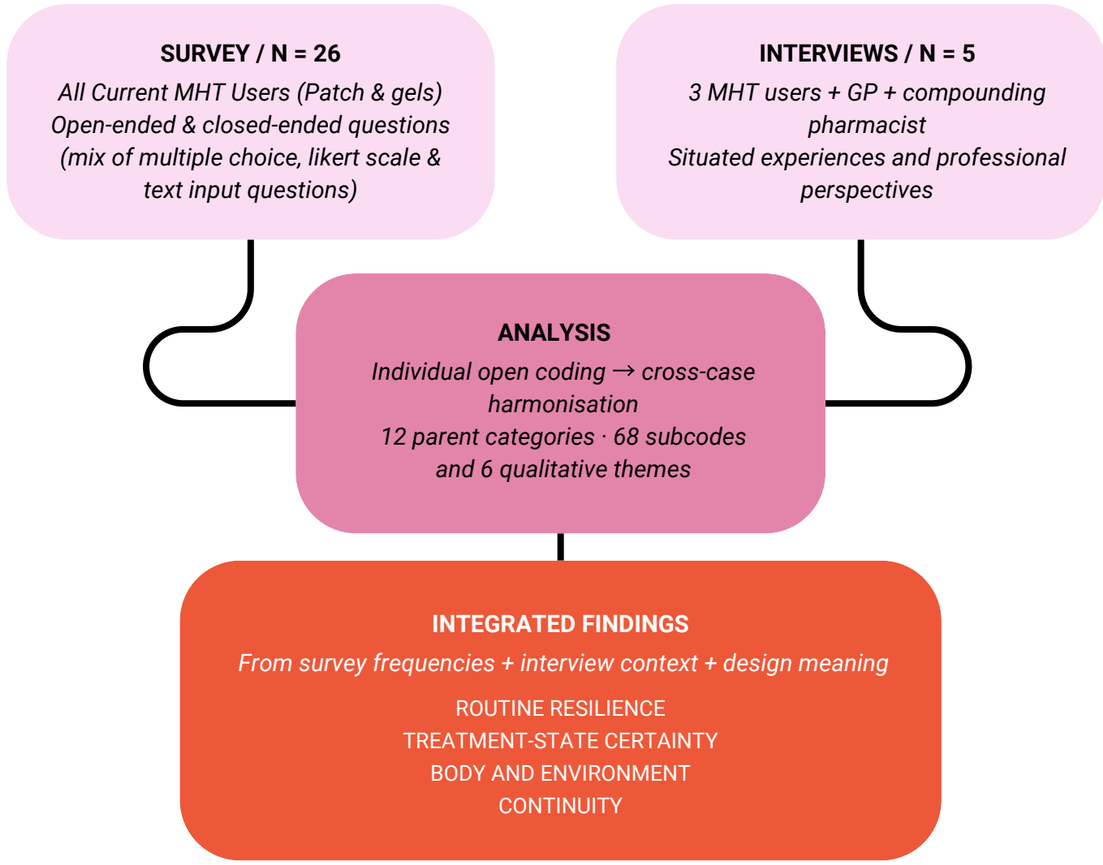
The analysis retained positive experiences, difficulties and differences between user and professional perspectives. User accounts provided detail about everyday treatment interactions, while the GP and pharmacist contributed perspectives on prescribing, dispensing, personalisation and care.

The six themes included:

1. ***Treatment is maintained by regular work, and any disruption shows how fragile it is.***
2. ***Users have the responsibility for their treatment without having an equivalent degree of certainty.***
3. ***Transdermal delivery interacts with not only the body, but the environment and other people.***
4. ***Continuity is based on the availability, supply and the care infrastructure.***
5. ***The suitability of treatment is personal and usually involves simplifying or adapting it.***
6. ***Understanding how to treat a condition is a continuous process which involves balancing/interpreting symptoms, and understanding advice from professionals.***

The six themes were then considered alongside the descriptive survey results. Four integrated findings were used to organise the combined evidence: routine resilience, treatment-state certainty, body and environment, and continuity. The qualitative themes were retained within this synthesis rather than replaced by the four findings.

FIGURE 6: RESEARCH ARCHITECTURE



The survey involving 26 participants and 5 interviews were analysed, leading to the identification of 68 subcodes, 12 parent categories, and 6 themes, which in turn yielded 4 integrated findings.

05 ANALYSIS & FINDINGS

The mixed-method analysis identified four interconnected conditions shaping the everyday experience of MHT: routine resilience; treatment-state certainty; embodied and environmental interaction; and continuity.

Finding 1: Routine Resilience

MHT management usually becomes feasible through repeated practice and the development of habits, with users explaining that they linked the treatment to routine activities, set up reminders and organised their medication at different locations. Participant 2 explicitly described using habit stacking:

"Therefore I have the habit every day of brushing my teeth in the morning, so I don't forget." - P2

This shows an important distinction in that treatment can become manageable since users establish a steady routine around it, not because the product necessarily helps with remembering.

Survey findings showed how easily this stability could be disrupted. 76.9 per cent had taken the MHT after it had been intended; 65.4% were not sure if they had already taken their treatment or had forgotten to do so. For 61.5 per cent of the cases there had been doubt about whether they were carrying out the routine correctly.

The routine was most frequently disrupted by busy schedules, changes to the normal routine, leaving home, and by illness or stress. The finding is therefore more specific than saying that 'users forget'; it is possible to remember the treatment but it may still not match the available time, privacy, sequence or location. Therefore, the design must support routine recovery rather than focusing only on ideal adherence, and the treatment status should still be clear when the user is late, away from home, or moving between different contexts.

Finding 2: Certainty Around Treatment State

Users are responsible for their treatment without receiving equivalent feedback. Uncertainty occurred at several different levels. This included understanding the prescribed regimen; knowing what amount had been dispensed; knowing whether the application interaction was complete; and determining whether the treatment was achieving the desired effect.

For gel and cream users, 55.0 per cent were unsure as to whether the intended quantity had been dispensed; Uncertainty as to how much of the medication was being absorbed was reported by 90.0%, and 65.0 per cent had felt uncertain regarding the correct way of applying it. For patch users, 81.8 per cent said they were uncertain whether they were receiving the correct hormone dose. Uncertainty as to whether the patch had been placed correctly was 45.5 per cent, and 54.5 per cent had previously experienced peeling or lifting before the desired change.

Participant 1 described the dispensing problem directly:

"There's no way of knowing just how much you're receiving" - P1

The interviews also revealed that users and professionals had different views on certainty. The participants with lived experience spoke about the uncertainty involved in giving and assessing treatment in practice, while those who were professionals talked about their understanding of the regimen, the act of dispensing it, titration, personalisation and monitoring. Therefore, he appropriate takeaway is not to assert with certainty that the product cannot properly provide it, rather, the design can make observable states clearer through: dose dispenser visability; completed application communication; next action steps; remaining supply; hormone absorption; and timing or sequence.

FIGURE 7: SURVEY-REPORTED DELAYS AND UNCERTAINTY IN TREATMENT ROUTINES

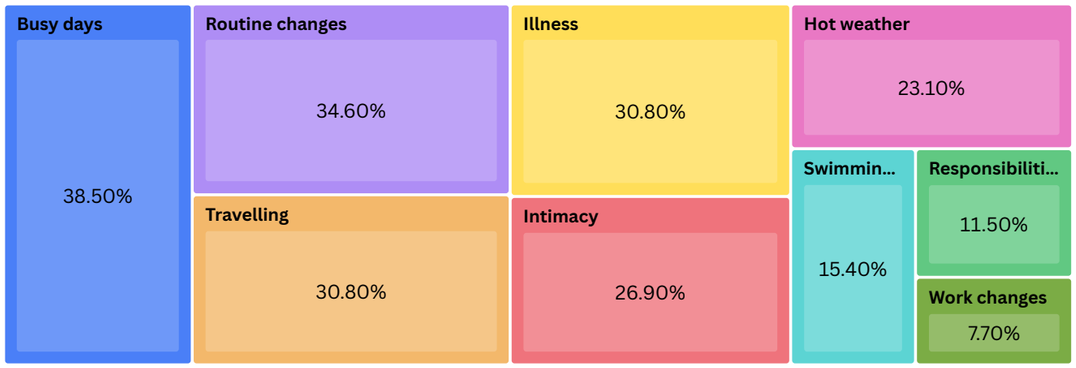
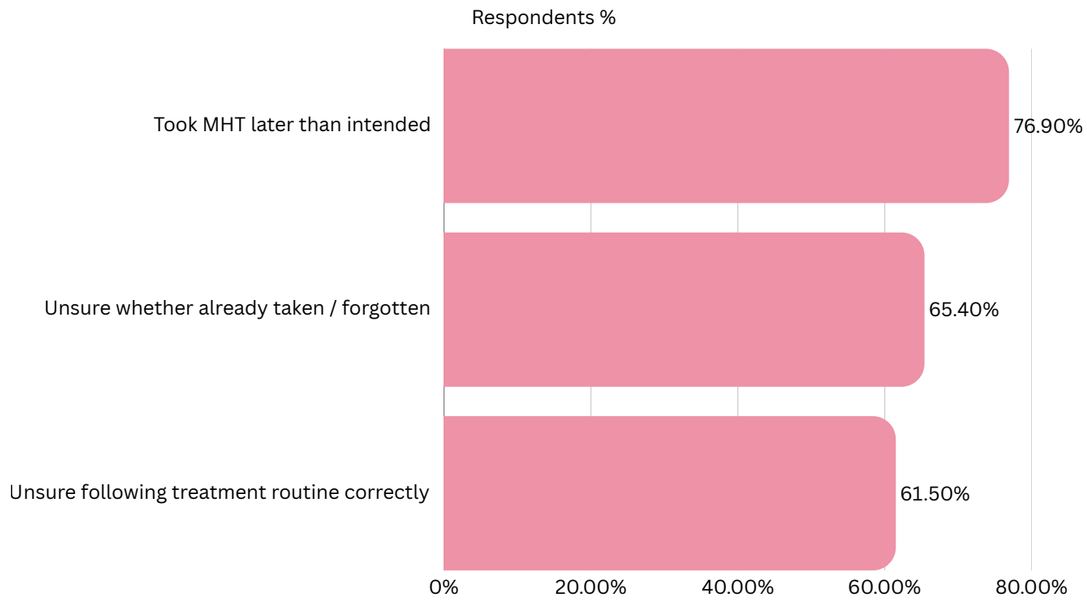


FIGURE 8: SURVEY RESULTS ON ROUTINE



Finding 3: Body and Environment

The interface for the treatment goes beyond the product itself. Transdermal treatment is affected by skin, drying time, clothing, heat, skincare, intimacy, residue and contact with other people. Among gel/cream users, application or drying disrupted the routine of 85.0 per cent. Before the product had dried, 75.0 per cent had been worried about the possibility of an accidental transfer and 65.0 per cent had experienced the product being wasted on their hands.

In the interviews for MHT user experiences, the participants spoke about waiting before putting on their clothes, about looking after their sunscreen or carrying out other skincare routines, about washing their hands, about thinking about how close they were to their partners and about adjusting their treatment in response to heat, travel and activity. Thus, the body and the environment are involved in the interface, and with regard to a topical therapy the interaction does not cease when the product is removed from the container.

A future design must remain compatible with clothing, the climate, skincare, and normal daily activities while reducing unnecessary contact, residue, and the risk of transfer. This supports design investigation into more contained application, clearer application-state cues, reduced medicine-contact surfaces, and materials and shapes that are appropriate for travel and for personal possessions.

Finding 4: Continuity

The management of treatment goes beyond administration to include matters of supply, travel and the care infrastructure. Continuity turned out to be a problem at a broader systems level. Out of a total of 26 cases of the user surveys, 84.6 per cent had travelled while on treatment. 73.1 per cent had undergone some difficulty with refills and 26.9 per cent had refill difficulties at least about half the time.

The people taking part in the interview mentioned having workaround to support continuity such as duplicate supplies, backup medication, storing their treatment in several places, drawing up contingency plans, and switching products. The system's provisions include bags, drawers, pharmacies, prescriptions, travel arrangements and backup plans.

Thus, consideration should be given to the issue of continuity before the product becomes empty or no longer available. Opportunities include: visible remaining supply; compact transport; secure storage; backup planning; modular treatment organisation; There should be clearer transitions between products or stages of treatment.

Qualitative Themes

The six themes established from qualitative analysis are what support the four integrated findings (rather than supplanting them), which indicated that the suitability of the treatment is personal, and that the users keep on learning and interpreting it through their symptoms, experiences and the guidance of professionals.

In each of the six themes there was evidence from all five of the interview participants, although the proportion of evidence provided by users rather than by professionals varied. The themes of routine, embodied interaction and transfer were particularly user-driven, while those relating to personalisation, monitoring and care pathways had a greater contribution from professionals. This supports a significant finding namely that users and professionals hold different positions within the same treatment system.

FIGURE 9: QUANTITATIVE ANALYSIS RESULTS

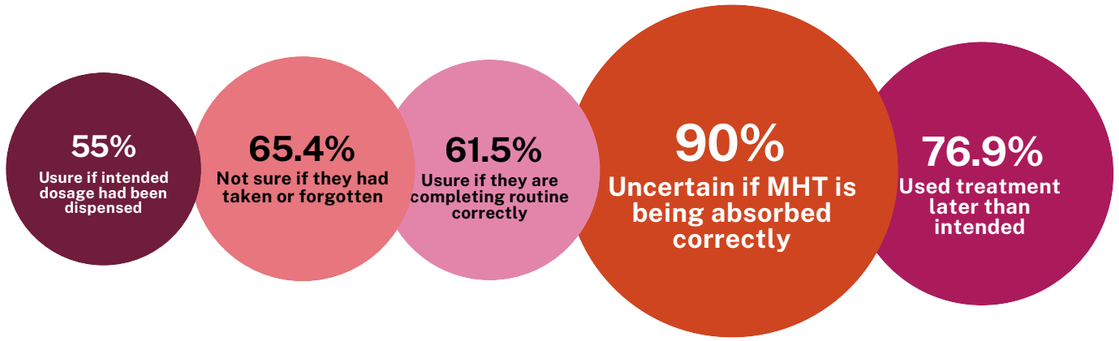
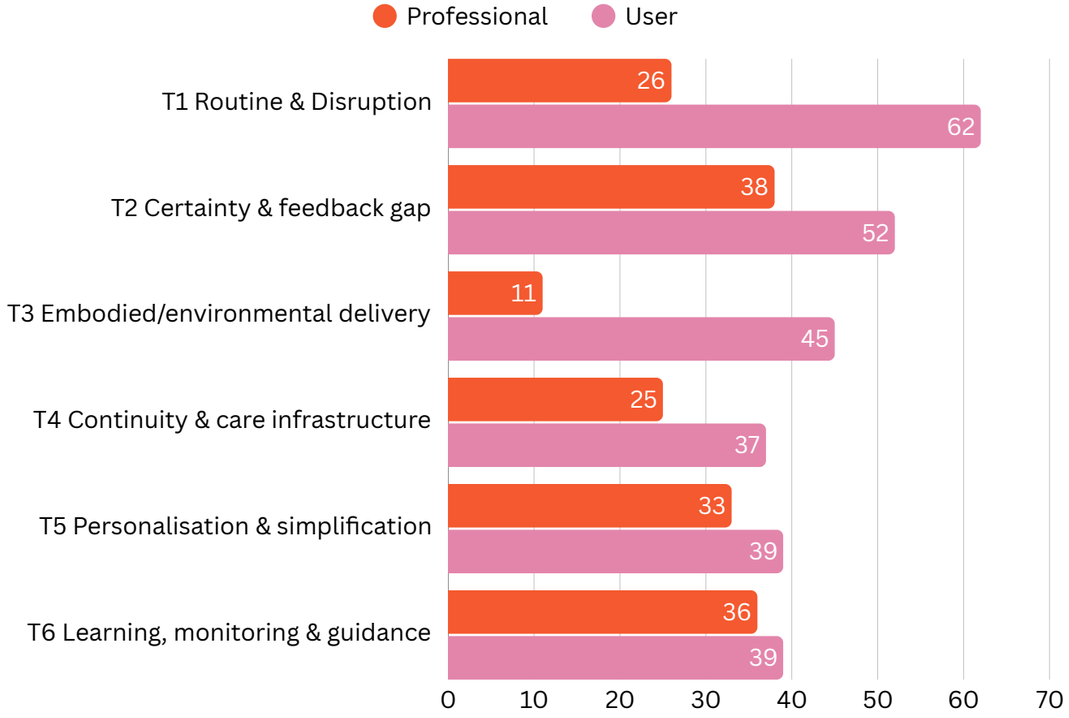


FIGURE 10: CODED REFERENCES BY THEME AND PARTICIPANT GROUP



Counts represent coded references rather than participant numbers. The user group comprises three participants and the professional group comprises two. Counts are descriptive and may be influenced by interview length and the number of references assigned to each theme.

06 DISCUSSION

Individualisation adds downstream interaction work.

The proper clinical guidance stresses the importance of personalised treatment, and this study does not question that principle. Rather, it shows that individualisation results in an additional amount of work; after the regimen has been chosen, the user has to carry it out once again.

A treatment might be clinically flexible but physically demanding. A format might be easy to handle yet offer very little feedback. A multi-product regimen could meet clinical needs adequately while needing more coordination. The opportunity in this case not just simplifying MHT at all costs, but reducing unnecessary interactions without taking away the required flexibility.

Users and professionals observe different sections of the same system.

The lived-user interviews provided detail about routine, privacy, clothing, travel, skincare, residue, transfer and workarounds. Whilst the professional participants contributed different perspectives around dispensing, regimen understanding, personalisation, product availability, communication, and care pathways.

One should not view these viewpoints as supporting one another; instead, they show different aspects of the same system. The fact that this difference exists is valuable when it comes to design, since some interaction problems are easily noticeable to the user, although they may seldom occur during a clinical consultation.

The treatment burden is conditional.

The results do not justify classifying current MHT as being generally difficult or impossible to use. A number of the participants set up steady routines and found effective workarounds. Certain treatment formats were well accepted as well. It was also possible for practical satisfaction and burden to exist together. Difficulty in meeting the requirements became more apparent when several of them came into conflict—for instance, when a routine changed, when treatment had to travel with them, when supplies became uncertain, or when topical application clashed with clothing, skincare or other activities.

The correct design response should therefore be resilience, not problematisation. The design question should there be reframed towards finding out which way menopausal hormonal treatment can be understandable and manageable if the everyday conditions become difficult.

FIGURE 11: INTEGRATED INTERPRETIVE MODEL

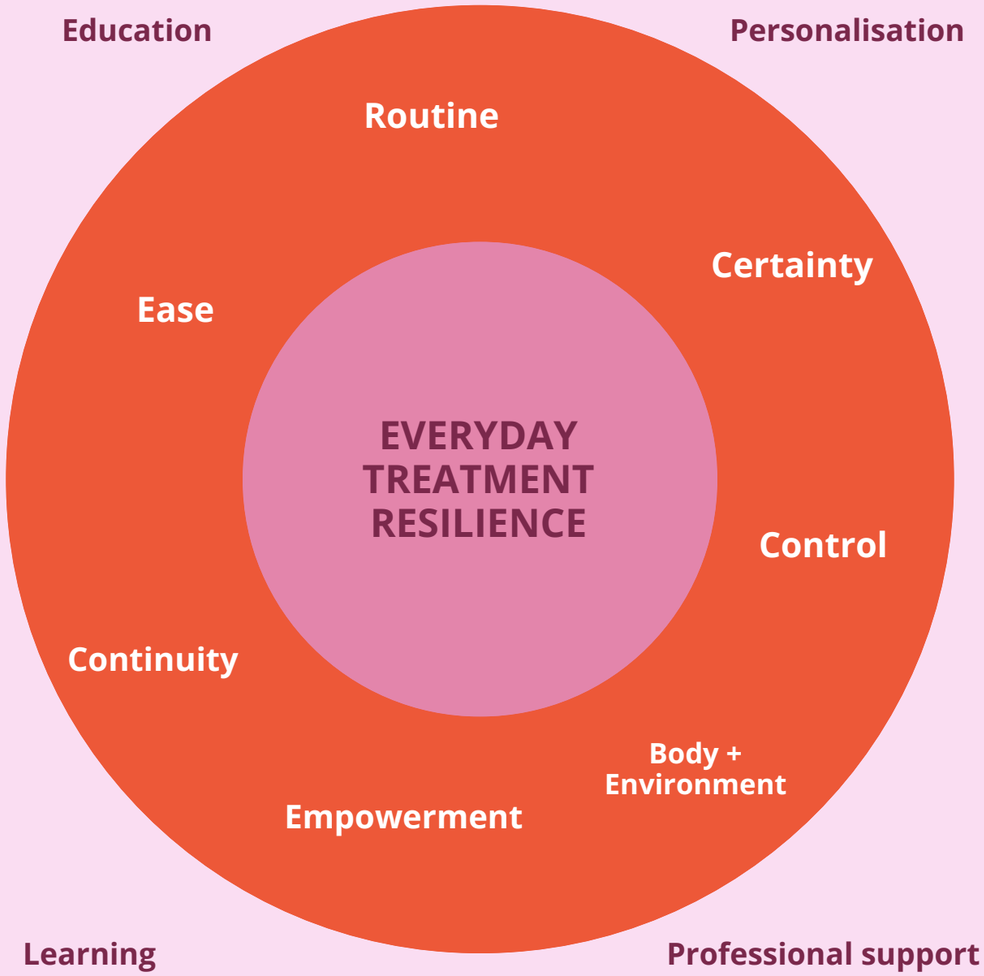


Figure 11 brings together the four integrated findings: routine, certainty, body and environment, and continuity. Personalisation, learning and professional support influence how these areas are experienced. Ease, control and empowerment represent proposed design aims rather than additional research findings.

07 DESIGN IMPLICATIONS

The combined evidence led to seven design requirements:

01 — Make treatment states observable

A user relies completely on their memory or estimates in order to understand legitimate product states. Potential states include: dose dispensed; application completed; next treatment step; timing; remaining supply.

02 — Reduce unnecessary interaction

Flexibility ought not to demand any more steps than are technically necessary. Actions that are carried out repeatedly—for example, pumping, spreading, cleaning, waiting and checking—should be looked at for any chance of reducing the mental and physical strain.

03 — Design for disrupted, not only ideal, routines

Treatment should remain understandable when: the user is late; away from home; travelling; applying sunscreen; exercising; sharing a space; or carrying treatment between locations. A good system should be capable of recovering following a disruption rather than suppose that perfect repetition will occur.

04 — Treat portability as core

Travel was a common thing within the group. Portability should therefore be seen as a main requirement rather than a secondary accessory. The design should consider: compactness; secure transport; discretion; environmental protection; and access to backup supply.

05 — Contain medicine-contact surfaces

Wherever possible, direct contact with the medication and any residue should be minimised.
This point is particularly relevant in the case of topical treatment since hand washing, the disposal of waste, and accidental transfer were constant concerns.
Any new applicator or material that comes into contact with a medication would have to undergo the necessary pharmaceutical and regulatory validation.

06 — Make remaining supply legible

Continuity starts even when the container has not yet been emptied.
The user should be able to plan to replace the supply well in advance by anticipating how much use remains rather than finding out unexpectedly that the supply has been used up. This may involve: remaining-dose indicators; physical supply-state cues; refill planning; and modular backup organisation.

07 — Support discretion without hiding safety information

Treatment is often found in personal areas, such as bathrooms, handbags, bedrooms, and when travelling. It is possible to make the product less obviously medical in character while still requiring identification, instructions, and safety information.

These requirements establish a clear boundary for concept development. The design may communicate dispensing, application, timing, sequence, remaining supply, storage or continuity, but should not diagnose symptoms, recommend dose changes or claim to confirm systemic hormone absorption without independent clinical validation.

OPPORTUNITY STATEMENT

"How can industrial design help facilitate easier understanding, dispensing, application, carrying and continued use of transdermal MHT in different everyday situations, without compromising the prescribed flexibility and simultaneously prevent extra cognitive load?"

The strongest opportunity is broader than a cosmetic pump redesign but more focused than a generic digital-health system. It lies in improving the physical treatment-management experience through clearer states, more contained interaction, portability and continuity.

TABLE 2: EVIDENCE TO DESIGN IMPLICATIONS

Evidence	Requirement	Translation to Design
Dose / state uncertainty	*1- Make states observable*	*Metered feedback and application confirmation*
Drying & transfer	*2- Contain interaction*	*Applicator and contained dispensing*
Routine disruption	*3- Support recovery*	*Routine dock and status cue*
Travel & storage	*4- Treat portability as core*	*Modular travel system*
Supply difficulty	*5- Show remaining quantity*	*Refill and continuity indicator*
Patch uncertainty	*6- Improve state cues*	*Feedback-enabled patch*
Personalisation	*7- Preserve adaptability*	*Modular and future delivery systems*

08 CONCLUSION

This study investigated an under-described part of transdermal MHT: the practical work required to sustain prescribed treatment in everyday life.

Secondary research established that MHT is clinically individualised and that different delivery routes introduce different interaction characteristics. Benchmarking showed that current treatment formats distribute certainty, handling, portability, and adaptability differently, while adjacent menopause technologies offer alternative approaches to feedback, personalisation, and longitudinal support.

Primary research showed that the everyday experience of MHT is shaped by four interconnected conditions: routine resilience, treatment-state certainty, embodied/environmental interaction and continuity. Users responded through habits, backups, altered timing, travel strategies, and other workarounds, while professional participants highlighted additional considerations around dispensing, communication, personalisation, and access.

The evidence does not suggest that transdermal MHT is universally difficult. Instead, it shows that relatively small interaction demands can become consequential when routines, environments or supply conditions change. Users frequently compensate through habits, backup supplies and other adaptations, indicating where existing MHT products rely on user-created infrastructure to support consistent, easy treatment.

The resulting industrial design opportunity is therefore neither a cosmetic packaging exercise nor an assumption that more digital technology is inherently better. The next design stage should investigate how prescribed MHT can become clearer, more contained, more portable and more resilient, while retaining treatment flexibility and remaining within defensible product-feedback boundaries. This provides a clear evidence base for concept development: future design decisions can be evaluated against verified research rather than novelty alone.

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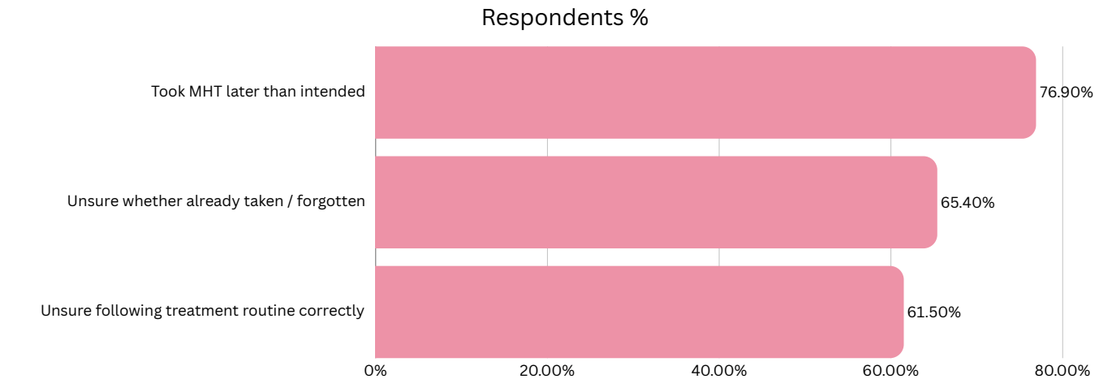
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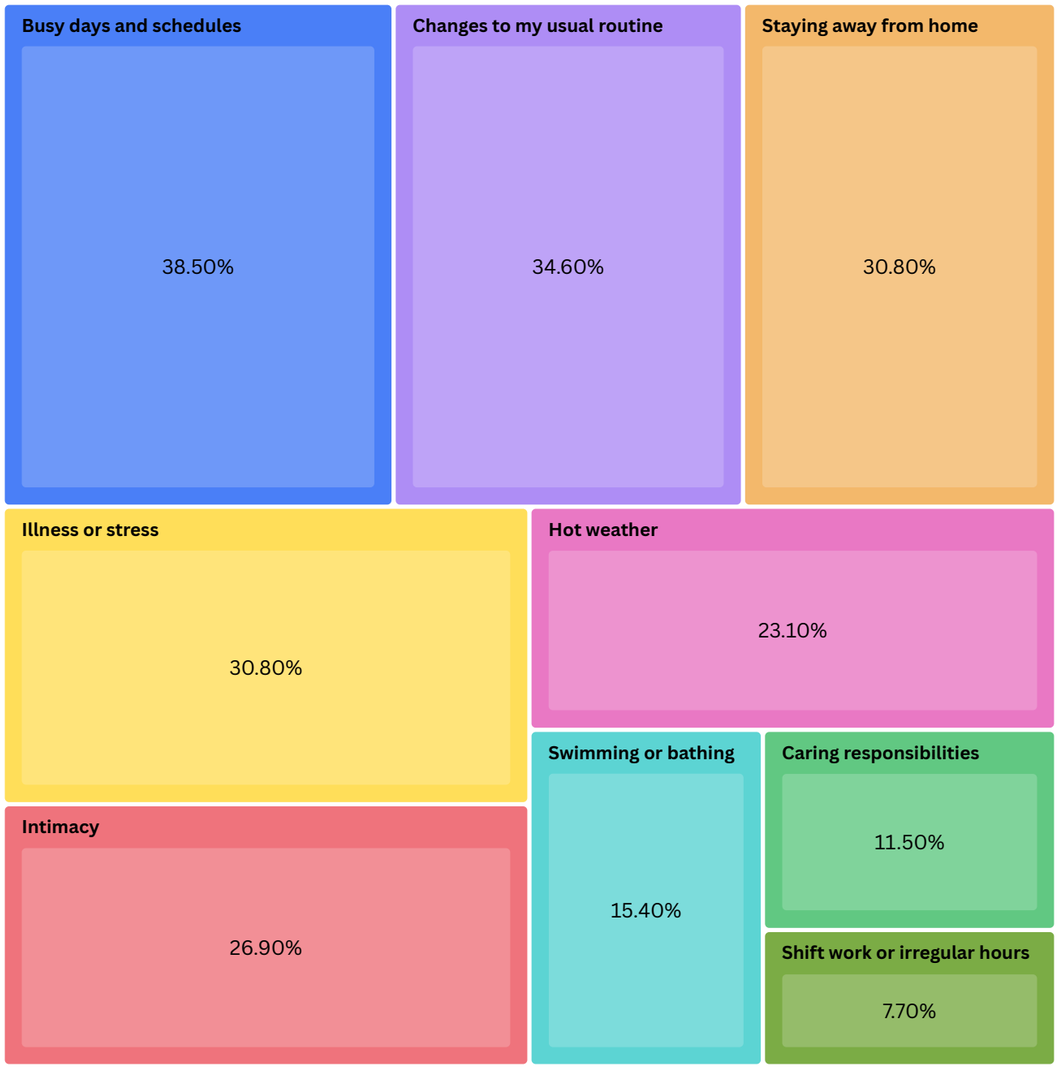
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Routine Management Friction

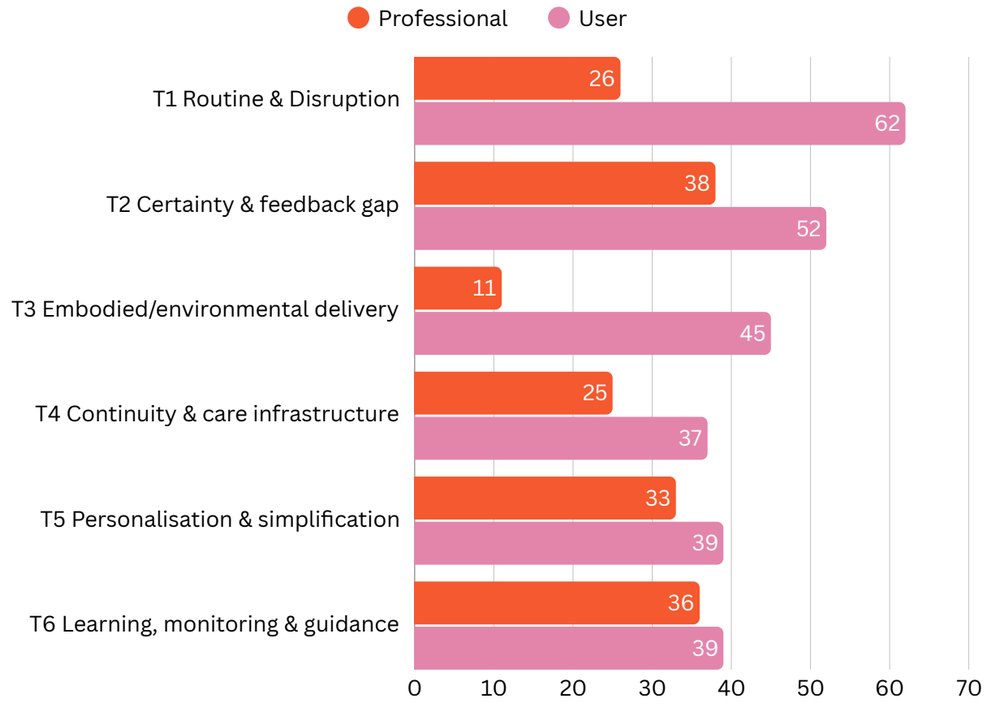


What disrupts treatment routines?

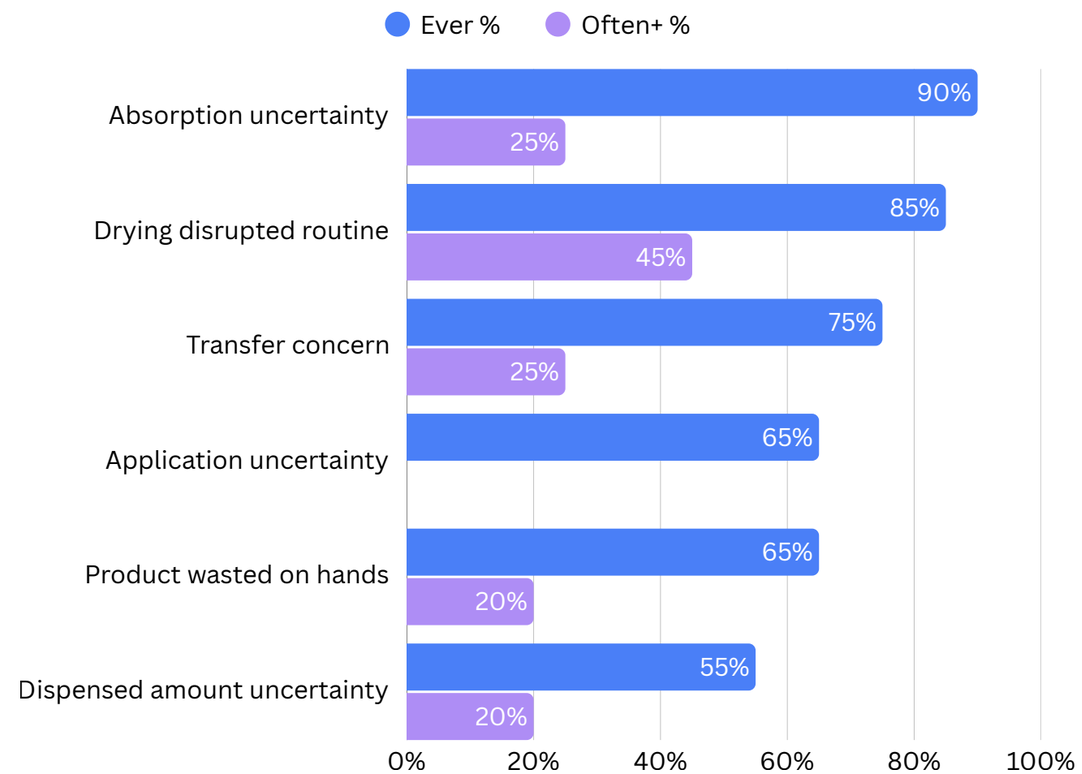


APPENDIX B — QUALITATIVE & QUANTITATIVE ANALYSIS

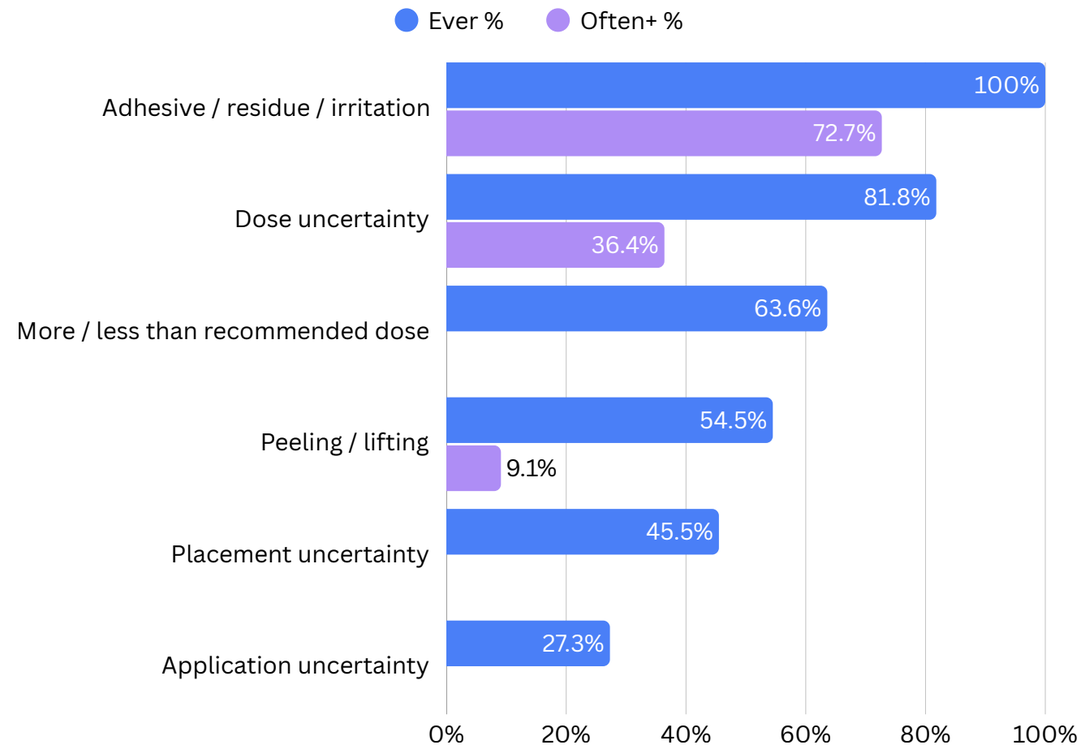
Lived-user and professional Experience theme evidence



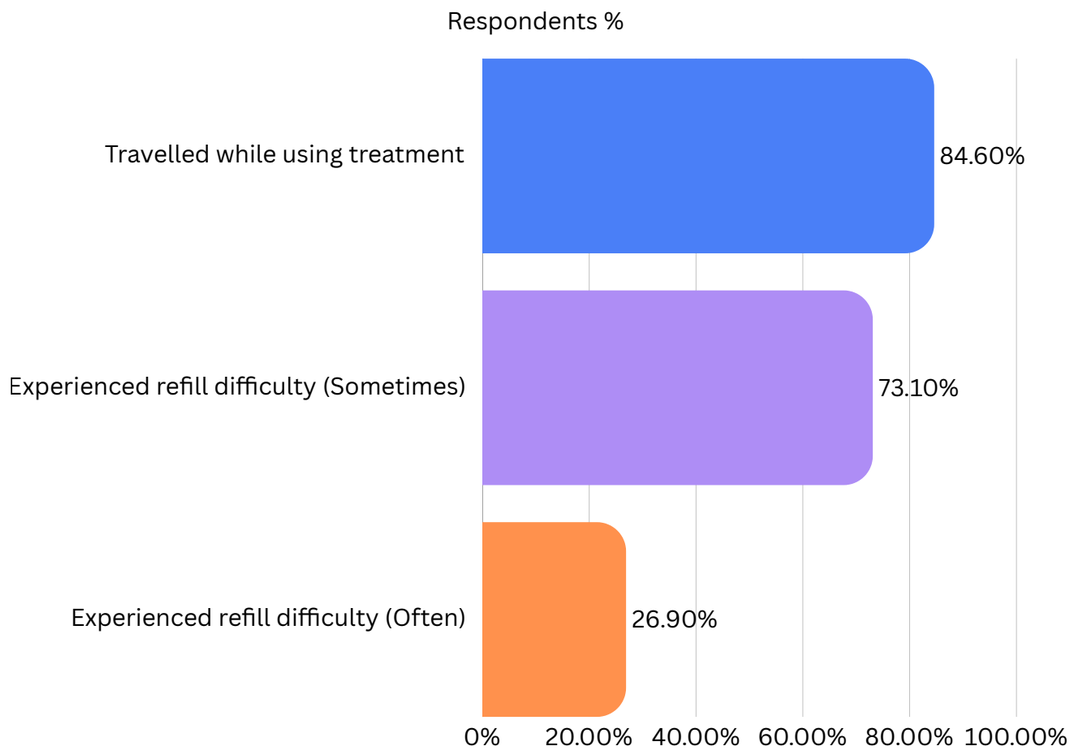
Gel/cream Interaction Challanges



Patch Interaction Challanges



Supply, Travel and Continuity



APPENDIX B — QUALITATIVE & QUANTITATIVE ANALYSIS

Final Resolved Coding Architecture

Parent category	Key resolved subcodes	No. subcodes
Routine & adherence	*Routine integration & habit formation; routine disruption & context change; forgetting, missed & irregular treatment; intentional deviation & prioritisation; reminders, tracking & remembering; management burden & cognitive load []*	6
Dose & regimen certainty	*Prescribed dose & regimen understanding; dispensing & measurement variability; dose taken & completion certainty; dose sufficiency & accuracy confidence; dose adjustment & titration uncertainty*	5
Application & absorption	*Application technique & steps; application site & rotation; drying / settling time; absorption & completion uncertainty; texture, residue & sensory experience; dispenser / applicator usability; skin, adhesion & physical reaction*	7
Transfer & contamination	*Other-person transfer risk; hands / self-contamination & washing; clothing / surface residue & transfer; precautions, containment & hygiene routines*	4
Lifestyle & environment	*Heat, humidity & climate; exercise, sweat, bathing & water exposure; skincare, sunscreen & topical-product interaction; clothing, fabrics & dressing; work, social & household compatibility*	5
Travel, storage & continuity	*Portability, size & packing; storage, temperature & protection; multiple locations & overnight living; supply continuity, backups & shortages; prescription / pharmacy access away from home; loss, security & transport constraints*	6
Privacy, visibility & aesthetics	*Privacy & discretion; medicalised appearance & labelling; aesthetic appeal & personal style; visibility, clutter & concealment; stigma, embarrassment & social judgement*	5
Information, guidance & communication	*Initial instruction & onboarding; changed or conflicting advice; information clarity & completeness; self-education & information seeking; source trust / misinformation; clinician communication; peer / social learning; professional knowledge gap*	8
Symptom & treatment interpretation	*Symptom awareness & monitoring; symptom attribution uncertainty; perceived treatment effectiveness; side effects; treatment-response uncertainty; clinical monitoring, testing & validation*	6
Treatment choice, personalisation & transitions	*Treatment form preference; personalisation & individual fit; switching / initiation / transitions; combination-regimen coordination; treatment decision-making & trade-offs*	5
Workarounds & adaptation	*Habit stacking; decanting / repackaging; backup stock; altered timing / site / technique; simplification / shortcuts*	5
Access, care pathway & professional support	*Access to knowledgeable expertise; appointments / referrals / prescribing; pharmacy availability; cost & affordability; care continuity; telehealth / online care*	6
TOTAL	**68 subcodes *(across 12 parent categories)***	

Parent Category vs Final Theme Matrix

Parent category	*T1 Routine*	*T2 Certainty*	*T3 Body + environment*	*T4 Continuity*	*T5 Personal fit*	*T6 Learning*
Routine & adherence						
Dose & regimen certainty						
Application & absorption						
Transfer & contamination						
Lifestyle & environment						
Travel, storage & continuity						
Privacy, visibility & aesthetics						
Information, guidance & communication						
Symptom & treatment interpretation						
Treatment choice, personalisation & transitions						
Workarounds & adaptation						
Access, care pathway & professional support						

Final theme for thematic analysis interpretation & explanation table

Final theme	Interpretive theme	Parent categories organised beneath it
T1	**Treatment is sustained through routine work, and disruption exposes fragility**	Routine & adherence; Workarounds & adaptation; Travel, storage & continuity
T2	**Users carry treatment responsibility without equivalent certainty**	Dose & regimen certainty; Application & absorption; Symptom & treatment interpretation
T3	**Transdermal delivery is negotiated with the body, environment and other people**	Application & absorption; Lifestyle & environment; Transfer & contamination; Privacy, visibility & aesthetics
T4	**Continuity depends on portability, supply and care infrastructure**	Travel, storage & continuity; Access, care pathway & professional support
T5	**Treatment fit is personal and often requires simplification or adaptation**	Treatment choice, personalisation & transitions; Workarounds & adaptation
T6	**Understanding treatment is an ongoing negotiation between symptoms, self-learning and professional guidance**	Information, guidance & communication; Symptom & treatment interpretation; Access, care pathway & professional support

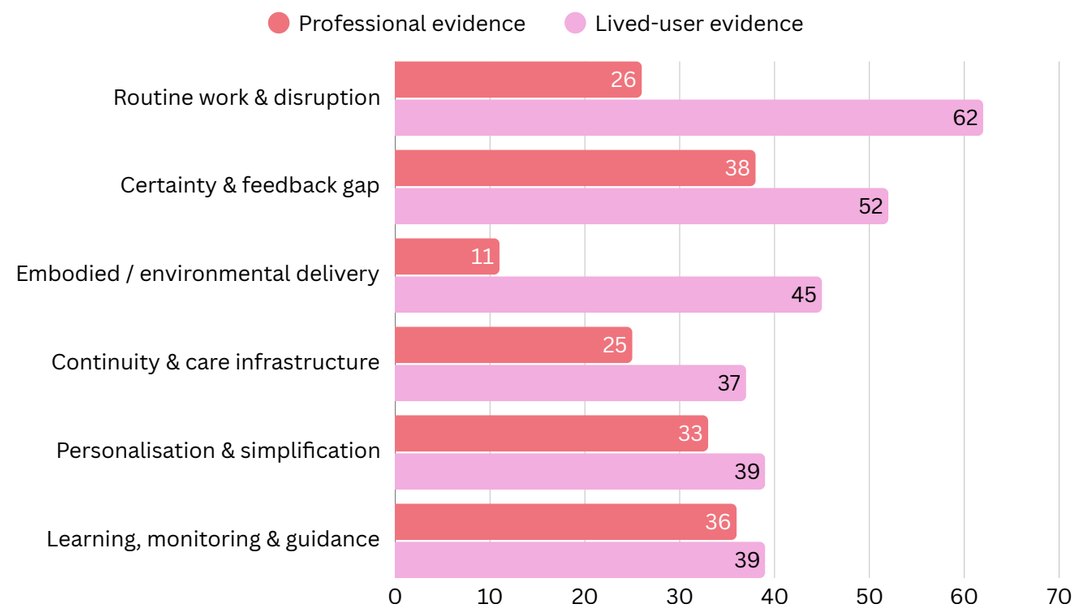
APPENDIX B — QUALITATIVE & QUANTITATIVE ANALYSIS

User vs professional evidence table

Theme	Parent categories	User units	Professional units	Total supporting units	Participants	Evidence confidence
T1 Routine work & disruption	3	62	26	88	5	*High*
T2 Certainty & feedback gap	3	52	38	90	5	*High*
T3 Embodied / environmental delivery	4	45	11	56	5	*High*
T4 Continuity & care infrastructure	2	37	25	62	5	*High*
T5 Personalisation & simplification	2	39	33	72	5	*Moderate–High*
T6 Learning, monitoring & guidance	3	39	36	75	5	*Moderate–High*

Supporting coding-unit counts are overlapping, non-additive and indicate analytic incidence rather than participant prevalence or importance..

User versus professional evidence bar chart



APPENDIX F — BENCHMARK SCORING FRAMEWORK AND DETAILED MATRIX

Benchmarking-derived Opportunity Gaps & Implications

Label	System role	Interaction ease	Feedback C2 *(weighted)*	Subgroup	Group
Gel pump	0.85	2.2	1	Systemic oestrogen	Direct Hormone Therapy
Gel sachet	1.1	2.75	1	Systemic oestrogen	Direct Hormone Therapy
Estradiol patch	0.9	4.55	2	Systemic oestrogen	Direct Hormone Therapy
Oral oestrogen	1.1	4.85	1	Systemic oestrogen	Direct Hormone Therapy
Oral progesterone	0.75	4.45	1	Progestogen component	Direct Hormone Therapy
Mirena	1.3	5	1	Long-acting component	Direct Hormone Therapy
Vaginal oestrogen cream	0.65	2.5	1	Local therapy	Direct Hormone Therapy
Vaginal tablet / ovule	1.25	4.25	1	Local therapy	Direct Hormone Therapy
Testosterone cream	1.15	2.15	1	Hormonal adjunct	Direct Hormone Therapy
Embr Wave 2	3.45	4.2	4	Symptom support	Assistive Care & Support
WellFemme	3.65	4.75	4	Care support	Assistive Care & Support
Juniper	3.85	4.55	4	Care support	Assistive Care & Support
Midi Health	3.55	4.45	4	Care support	Assistive Care & Support
Evernow	3.75	4.3	4	Care support	Assistive Care & Support
Stella	4	4.9	4	Digital support	Assistive Care & Support
Peri	4.25	4.75	5	Monitoring	Monitoring & Interpretation
Natural Cycles	4.45	4.45	4	Interpretation	Monitoring & Interpretation
Oura	4.65	5	5	Passive monitoring	Monitoring & Interpretation
Mira	5	2.7	5	Active measurement	Active Measurement

Benchmarking Criteria Key

Code	Criterion	1 Score means	5 Score means
C1	Dose / state certainty	Ambiguous / estimation-led	Discrete, observable state
C2	Feedback / self-monitoring	Little or no feedback	Structured / continuous feedback
C3	Routine compatibility	High routine disruption	Low-friction routine fit
C4	Handling simplicity	Multi-step / messy	Simple / contained
C5	Portability	Awkward / storage-heavy	Compact / travel-ready
C6	Discretion	Visible / medicalised	Discreet / socially integrated
C7	Containment	High residue/contact burden	Highly contained
C8	Adaptability	Fixed / generic	Highly adaptable
C9	Continuity	Fragile access	Resilient / flexible access

Benchmarking-derived Opportunity Gaps & Implications

No.	Opportunity gap	Industrial design implication
1	The feedback gap is larger than the delivery gap	Make observable states visible: dispensed dose, application event, timing, remaining volume or routine state
2	Gel flexibility currently comes with interaction debt	Preserve titration while reducing pumping, counting, spreading, drying, mess and ambiguity
3	Perimenopause creates a state-management problem	Explore prescribed-dose state, phase-aware cues, calendar logic and treatment transitions
4	Portability and discretion are competitive expectations	Develop contained transport, discreet aesthetics and separation of medicine-contact surfaces
5	Continuity must survive product switching	Prefer modular / brand-tolerant architecture where feasible
6	Adjacent femtech has raised expectations for personalisation	Make changing treatment states and user-specific patterns easier to understand and discuss
7	Do not overclaim “absorption confirmation”	Limit product feedback to what can genuinely be verified: dispensing, application and timing unless clinically validated

APPENDIX F — BENCHMARK SCORING FRAMEWORK AND DETAILED MATRIX

Benchmarking Heatmap Data - Direct MHT Delivery Formats

ID	MHT system / archetype	C1	C2	C3	C4	C5	C6	C7	C8	C9
D01	Estradiol gel pump	3	1	3	2	2	3	2	5	4
D02	Estradiol gel sachet	5	1	3	2	4	4	2	4	4
D03	Estradiol patch	5	2	5	4	5	3	5	4	3
D04	Sequential combined patch	5	2	3	3	5	3	5	2	4
D05	Continuous combined patch	5	2	5	4	5	3	5	2	4
D06	Oral E2 + cyclic progesterone	5	1	3	5	5	5	5	4	5
D07	Transdermal E2 + LNG-IUS	5	1	4	4	4	3	5	4	4
D08	Estrogel Pro co-pack	3	1	3	2	2	3	2	4	5

Benchmarking Heatmap Data - Adjacent Innovation for MHT Management

ID	Adjacent benchmark	C1	C2	C3	C4	C5	C6	C7	C8	C9
A01	Peri	1	5	5	4	5	4	5	5	3
A02	Oura Menopause Insights	1	5	5	5	5	5	5	5	5
A03	NC° Perimenopause	1	4	4	5	5	5	5	5	5
A04	Mira Ultra4	1	5	2	2	3	3	4	5	4
A05	Embr Wave 2	1	4	4	4	5	4	5	5	4
A06	WellFemme	3	4	4	5	5	4	5	5	4
A07	Juniper Menopause	3	4	4	5	5	4	5	5	4
A08	Stella	1	4	5	5	5	5	5	5	4
A09	Midi Health	3	4	4	5	5	4	5	5	4
A10	Evernow	3	4	4	5	5	4	5	5	4

APPENDIX F — BENCHMARK SCORING FRAMEWORK AND DETAILED MATRIX

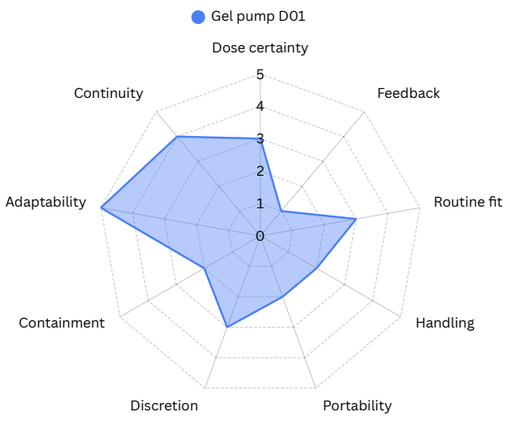
Direct Format MHT Profiles

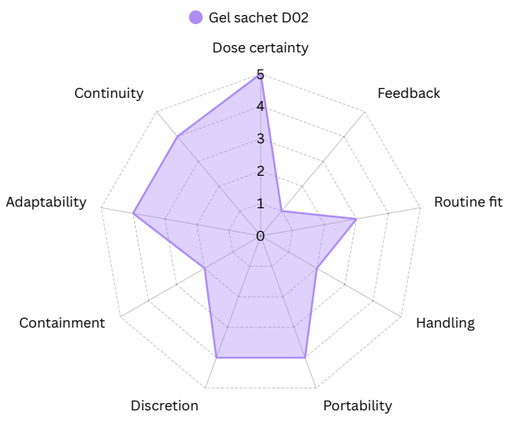
Criterion	Gel pump D01	Gel sachet D02	Estradiol patch D03	Oral E2 + cyclic P D06
C1 Dose / state certainty	3	5	5	5
C2 Feedback & self-monitoring	1	1	2	1
C3 Routine compatibility	3	3	5	3
C4 Handling simplicity	2	2	4	5
C5 Portability & travel	2	4	5	5
C6 Discretion & social fit	3	4	3	5
C7 Transfer / contamination control	2	2	5	5
C8 Personalisation & adaptability	5	4	4	4
C9 Continuity & access resilience	4	4	3	5

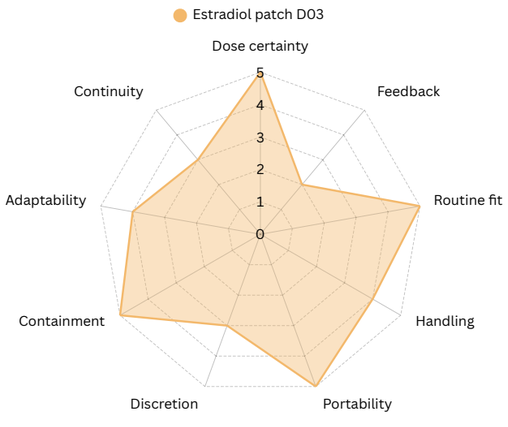
Adjacent Innovation Profiles

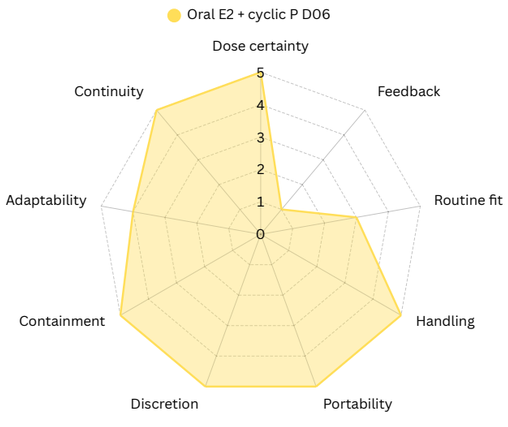
Criterion	Peri A01	Oura A02	Mira A04	Embr A05
Feedback depth	5	5	5	4
Routine integration	5	5	2	4
Interaction simplicity	4	5	2	4
Portability	5	5	3	5
Discretion	4	5	3	4
Personalisation	5	5	5	5
Continuity	3	5	4	4

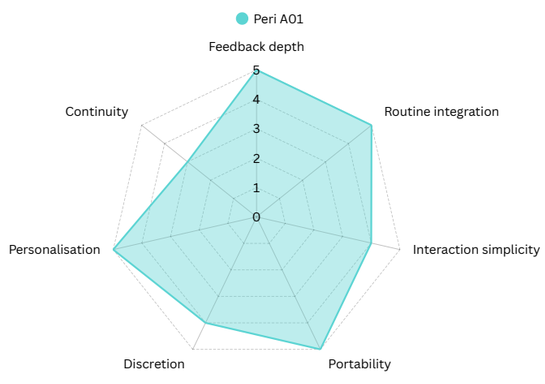
C1-9 were altered to fit adjacent product domains of ranking (i.e. excluded Dose/ state certainty & Transfer/ contamination. Altered handeling to interaction)

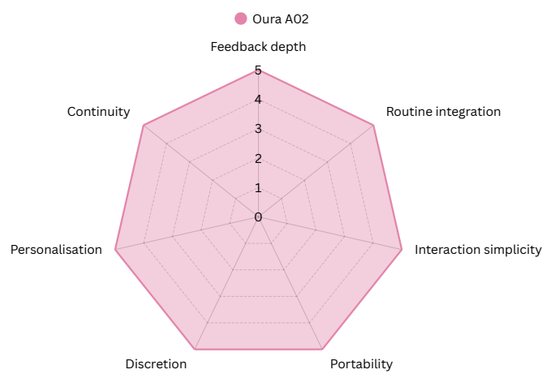


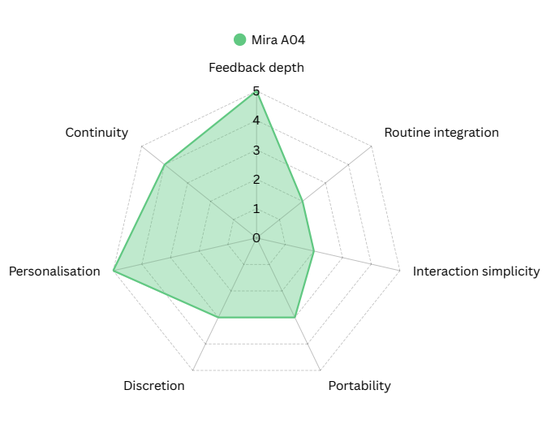


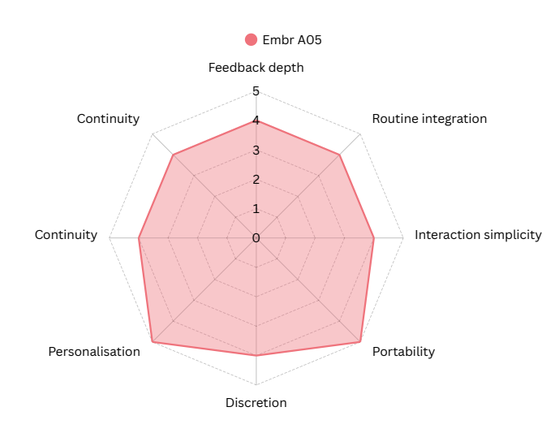












APPENDIX F — BENCHMARK SCORING FRAMEWORK AND DETAILED MATRIX

DNB311 MHT MARKET RESEARCH & BENCHMARKING						
Scoring	1–5 scores are relative design-research synthesis ratings. They are not clinical efficacy, safety, risk, pharmacokinetic or suitability ratings.					
Perimenopause focus	Selection around systems relevant to starting, changing or cyclically managing MHT during mainly perimenopause					
SCORING CRITERIA		**SCORING**				
C1 · Dose / state certainty	*Clarity that the intended treatment unit/state has been prepared, dispensed, applied or accessed. This does not mean*	1 = Ambiguous / estimation-led				5 = Discrete, observable state
C2 · Feedback & self-monitoring	*Useful user-readable feedback about use, symptoms, trends or physiological response.*	1 = Little/no feedback				5 = Structured or continuous feedback
C3 · Routine compatibility	*Ease of embedding repeated treatment/support into variable daily and weekly routines.*	1 = High routine disruption				5 = Low-friction routine fit
C4 · Handling simplicity	*Manual and cognitive burden of preparation, application, cleaning, sequencing and disposal.*	1 = Multi-step / messy				5 = Simple, contained
C5 · Portability & travel	*Compactness and practicality for commuting, overnight stays and travel.*	1 = Awkward / storage-heavy				5 = Compact / travel-ready
C6 · Discretion & social fit	*Privacy, visibility and the extent to which the system avoids feeling conspicuously medicalised.*	1 = Visible / medicalised				5 = Discreet / socially integrated
C7 · Transfer / contamination control	*How well the interaction contains medicine/residue and reduces unintended contact or handling contamination.*	1 = Substantial residue/contact burden				5 = Highly contained
C8 · Personalisation & adaptability	*Capacity to accommodate prescribed titration, individual patterns or personalised interpretation.*	1 = Fixed / generic				5 = Highly adaptable / personalised
C9 · Continuity & access resilience	*Resilience to medicine supply, replacement, consumable, hardware or service-access disruptions.*	1 = Fragile / single-point dependency				5 = Established / flexible access