

Upgrading Endocrine Test Requisition Forms to Improve Diagnostic Accuracy and Reduce Pre-Analytical Errors: A Review

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Abstract

Background: Endocrine investigations heavily depend on accurate pre-analytical practices, and even minor communication errors between clinicians and laboratories can lead to mystifying or ambiguous hormone results. In many healthcare settings, the standard requisition form is not sufficiently detailed, so it fails to capture important clinical information such as specific symptoms, current medications, menstrual status, timing, and specific patient preparation requirements. Each of these factors is required to ensure accurate and reliable interpretation of hormonal tests. This review evaluates the limitations of commonly used requisition forms and suggests remedial measures to minimise errors and improve diagnostic accuracy. Strengthening and formalizing basic, but this vital document can significantly enhance the overall quality of endocrine reporting and thereby ensure improved patient care and more accurate clinical decision-making.

Keywords: Cholesterol, Ischemic Stroke, Hemorrhagic Stroke, Dyslipidemia, Mortality.

Received: 22 December 2025

Revised: 10 January 2026

Accepted: 29 January 2026

Published: 31 January 2026

INTRODUCTION

Hormone assays differ from routine biochemical tests in the degree to which they fluctuate with physiological and external influences. Parameters such as cortisol, ACTH, TSH, LH, prolactin, and various reproductive hormones may vary with time of day, stress, cycle phase, posture, and fasting status.³ These fluctuations make it essential for laboratories to receive adequate background information. Unfortunately, in real-world practice, requisition forms often fail to capture these details. A considerable proportion of laboratory errors—much of it at the pre-analytical stage—arises from issues such as incomplete forms, unclear test instructions, or missing clinical context.^[1,2] As endocrine testing increasingly incorporates dynamic procedures like stimulation and suppression tests, the need for a more structured and comprehensive requisition form becomes even more important. Components recommended in a modern endocrine requisition form are shown in [Table 1].

Why Endocrine Tests Need Detailed Requisition Forms Biological Variability

Endocrine markers demonstrate significant physiological variations. Cortisol and ACTH follow circadian patterns, while hormones such as LH and GH are secreted in pulses. Estradiol and progesterone shift across the menstrual cycle. Without these details, laboratories may misinterpret values that are actually physiologically normal.^[3] Key pre-analytical variables influencing endocrine assays are shown in [Table 2].

Influence of Medications

Many commonly prescribed drugs—including steroids, thyroxine, biotin supplements, antiepileptic agents, oral

contraceptives, and certain psychiatric medications—can distort hormone levels or interfere with immunoassay methods.^[4] A clear record of medications being taken is therefore vital for the laboratory.

Relevance of Clinical History

Pregnancy, acute illness, recent surgery, weight changes, and suspected endocrine disorders all influence interpretation. When this information is missing, laboratories may be forced to rely on assumptions, often resulting in repeat sampling or unnecessary investigations.

Dependence on Precise Timing for Dynamic Tests

Dynamic tests, such as ACTH stimulation, dexamethasone suppression, and glucose tolerance testing, require samples at specific intervals. Incorrect or missing time annotations can make results unusable.^[5] A dedicated section for time-points removes confusion for both clinicians and laboratory staff.

Common Shortcomings in Existing Requisition Forms

Many routinely used forms are general-purpose documents meant for all biochemical tests. As a result, they frequently lack:

- A place for menstrual or obstetric history
- Clear fields for medication details

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DOI:
10.21276/amt.2026.v13.i1.322

How to cite this article: Mohan KA, Sumanam RSNE, Gowda S. Upgrading Endocrine Test Requisition Forms to Improve Diagnostic Accuracy and Reduce Pre-Analytical Errors: A Review. *Acta Med Int.* 2026;13(1):197-201.

- Fasting status or posture information
- Spaces for the time of sample collection
- Structured templates for dynamic testing
- Prompts for known analytical interferences
- Integration with laboratory information systems (LIS).^[6]

Such gaps often lead to misinterpretation, longer turnaround times, or unnecessary repetition—pathways from incomplete requisition to diagnostic error, as shown in [Figure 1].

Suggestions for Upgrading Endocrine Requisition Forms

1. Mandatory Patient Identifiers

Basic demographic information must be complete. Pregnancy status should be highlighted clearly because it significantly affects thyroid, gonadotropin, glucose, and prolactin levels.^[7]

2. Comprehensive Clinical Information Area

A well-designed form should include a provisional diagnosis, the duration of symptoms, the menstrual cycle day, and relevant comorbidities. This helps the lab place hormone values in the correct clinical context.

3. Structured Medication Checklist

A tick-box design ensures clinicians can quickly indicate drugs such as:

- Thyroxine
- All forms of steroids
- OCP or hormone therapy
- Biotin supplements
- Antiepileptics
- Vitamin D/calcium
- Antidiabetic drugs. Providing this information can prevent misinterpretation of altered or falsely elevated hormone results.^[4] Medications commonly interfering with endocrine assays are shown in [Table 3].

4. Clear Sample Collection Details

Essential entries include:

- Time of sampling
- Fasting status

- Posture (relevant for renin–aldosterone ratio)
- Time of most recent medication dose
- Rest period before prolactin collection. Incorrect timing remains one of the main causes of erroneous endocrine values.^[5]

5. Dedicated Sections for Dynamic Endocrine Tests

Pre-printed templates with fixed spaces for 0, 30, 60, and other applicable time points greatly simplify processes for ACTH stimulation, dexamethasone suppression, OGTT, GH testing, and water deprivation testing.

6. Area for Potential Interferences

Labs benefit when clinicians indicate:

- Recent contrast exposure
- Possible macroprolactin
- Heterophile antibody issues
- Blood transfusion history. This information helps the laboratory troubleshoot unexpected results.^[7]

7. Integration with LIS/HIS

Electronic forms can automatically flag missing information, generate reminders to time-stamp, and warn about known drug–test interactions. Such systems have been shown to significantly reduce pre-analytical errors.^[8] Improved diagnostic workflow with an upgraded form, as shown in [Figure 2].

Benefits of an Improved Requisition Form

A well-designed endocrine requisition form results in:

- Fewer rejections and repeat samples
- Higher diagnostic confidence
- Better clinician–laboratory communication
- Faster turnaround times
- Enhanced compliance with accreditation standards.^[6]
- Overall improved patient outcomes

Even small upgrades can have a major impact on workflow and diagnostic safety.

The proposed template for an endocrine test requisition form is shown in [Figure 3].

RESULTS

Table 1: Components Recommended in a Modern Endocrine Requisition Form

Category	Details Required
Patient identifiers	Name, age, sex, pregnancy status, MRN
Clinical history	Symptoms, duration, diagnosis, comorbidities
Cycle/obstetric data	LMP, cycle day, trimester
Medication checklist	Thyroxine, steroids, OCP, biotin, etc.
Sample timing	Exact collection time, posture, fasting status
Dynamic test fields	Fixed slots for baseline and timed samples
Special interference alerts	Contrast exposure, transfusion history

Why Endocrine Tests Need Detailed Requisition Forms

Biological Variability

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while hormones such as LH and GH are secreted in pulses. Estradiol and progesterone shift across the menstrual cycle. Without these details, laboratories may misinterpret values that are actually physiologically normal.^[3]

Table 2: Key Pre-Analytical Variables Influencing Endocrine Assays

Pre-analytical Factor	Affected Hormones / Tests	Clinical Impact
Circadian rhythm	Cortisol, ACTH, TSH	Misleading interpretation if sampling time not recorded
Fasting status	Insulin, C-peptide, GH, glucose	False hypo/hyperglycaemia or abnormal insulin levels
Menstrual cycle phase	Estradiol, progesterone, LH, FSH	Incorrect classification of ovarian dysfunction
Posture (supine/upright)	Aldosterone, renin	Incorrect ARR values; misdiagnosed PA

Stress/resting state	Prolactin, GH	Stress-induced false elevation
Pregnancy	TSH, FT4, prolactin, β-hCG	Failure to apply pregnancy-specific reference ranges
Medications	Steroids, OCP, biotin, antiepileptics	Drug-induced false highs/lows or assay interference
Sample handling	ACTH, PTH	Hormone instability causing falsely low values

Influence of Medications: Many commonly prescribed drugs—including steroids, thyroxine, biotin supplements, antiepileptic agents, oral contraceptives, and certain psychiatric medications—can distort hormone levels or interfere with immunoassay methods.^[4] A clear record of medications being taken is therefore vital for the laboratory.

Relevance of Clinical History: Pregnancy, acute illness, recent surgery, weight changes, and suspected endocrine disorders all influence interpretation. When this information is missing, laboratories may be forced to rely on assumptions, often resulting in repeat sampling or unnecessary investigations.

Dependence on Precise Timing for Dynamic Tests: Dynamic tests, such as ACTH stimulation, dexamethasone suppression, and glucose tolerance testing, require samples at specific intervals. Incorrect or missing time annotations

can make results unusable.^[5] A dedicated section for time-points removes confusion for both clinicians and laboratory staff.

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Many routinely used forms are general-purpose documents meant for all biochemical tests. As a result, they frequently lack:

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- Fasting status or posture information
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- Structured templates for dynamic testing
- Prompts for known analytical interferences
- Integration with laboratory information systems (LIS)⁶

Such gaps often lead to misinterpretation, longer turnaround times, or unnecessary repetitions.

Table 3: Medications Commonly Interfering with Endocrine Assays

Drug Category	Mechanism	Affected Tests
Biotin supplements	Immunoassay interference	TSH, FT4, cortisol, troponin
Glucocorticoids	HPA axis suppression	Cortisol, ACTH
OCP/HRT	Alters SHBG; increases binding	Estradiol, TSH, prolactin
Thyroxine	Exogenous hormone effect	FT4, TSH
Antiepileptics	Enzyme induction	Vitamin D, thyroid hormones
Antipsychotics	Raises prolactin	Prolactin
ACE inhibitors / ARBs	Alter renin-angiotensin	Renin, aldosterone

4. Clear Sample Collection Details

Essential entries include:

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Electronic forms can automatically flag missing information, generate reminders to timestamp, and warn about known drug–test interactions. Such systems have been shown to reduce pre-analytical errors significantly.^[8]

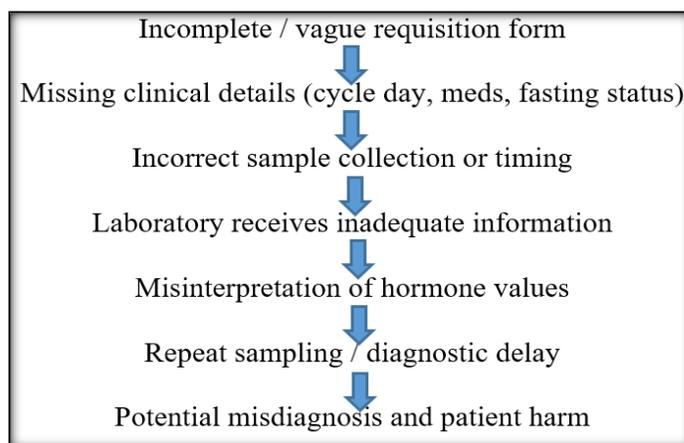


Figure 1: Pathway from Incomplete Requisition to Diagnostic Error

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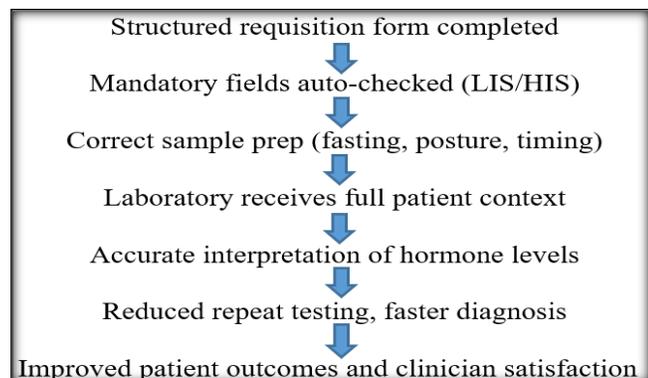


Figure 2: Improved Diagnostic Workflow with an Upgraded Form

Endocrine Test Requisition Form	
1. PATIENT INFORMATION	
Name: _____	Age: _____ Sex: _____
Hospital / MRD Number: _____	
Contact Number: _____	
Pregnancy Status: <input type="checkbox"/> Yes <input type="checkbox"/> No If Yes, Trimester: _____	
2. CLINICAL DETAILS	
Provisional Diagnosis: _____	
Symptoms & Duration: _____	
Comorbidities (CKD / Liver disease / Acute illness): _____	
3. MENSTRUAL / OBSTETRIC HISTORY	
LMP: _____	
Cycle Day: _____	
Obstetric Status (G/P): _____	
Trimester (if pregnant): _____	
4. MEDICATION CHECKLIST (Tick all that apply)	
<input type="checkbox"/> Thyroxine <input type="checkbox"/> Steroids (oral / inhaled / topical)	
<input type="checkbox"/> OCP / HRT <input type="checkbox"/> Antiepileptics	
<input type="checkbox"/> Biotin Supplements <input type="checkbox"/> Psychiatric Medications	
<input type="checkbox"/> Vitamin D / Calcium <input type="checkbox"/> Insulin / OHA	
Other Medications: _____	
5. SAMPLE COLLECTION DETAILS	
Fasting Status: <input type="checkbox"/> Fasting <input type="checkbox"/> Non-fasting	
Time of Sample Collection: _____	
Posture: <input type="checkbox"/> Supine <input type="checkbox"/> Upright <input type="checkbox"/> Unknown	
Last Medication Dose Time: _____	
Rest Before Prolactin Sampling: _____ minutes	
6. DYNAMIC TEST SECTION (If applicable)	
Test Name: _____	Result / Notes
Time Point	
Baseline (0 min)	
30 minutes	
60 minutes	
90 minutes	
120 minutes	
7. SPECIAL INTERFERENCE / CRITICAL ALERTS	
<input type="checkbox"/> Recent Contrast Exposure	
<input type="checkbox"/> Recent Blood Transfusion	
<input type="checkbox"/> Suspected Macroprolactin	
<input type="checkbox"/> Possible Heterophile Antibodies	
<input type="checkbox"/> Biotin intake (last 48–72 hours)	
Other Concerns: _____	

Figure 3: Proposed Template for an Endocrine Test Requisition Form

Benefits of an Improved Requisition Form

A well-designed endocrine requisition form results in:

- Fewer rejections and repeat samples
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Even small upgrades can have a major impact on workflow and diagnostic safety.

DISCUSSION

The present review highlights an often underestimated but critically important component of endocrine diagnostics—the test requisition form. While significant attention in laboratory medicine is directed toward analytical accuracy and post-analytical reporting, a large proportion of errors continue to arise during the pre-analytical phase. Endocrine investigations are uniquely vulnerable to such errors because hormone concentrations are highly influenced by physiological rhythms, patient preparation, medications, and precise sampling protocols. When these variables are not clearly communicated to the laboratory, even technically accurate assays may produce clinically misleading interpretations. As demonstrated in [Table 2], factors such as circadian rhythm, fasting status, menstrual cycle phase, posture, stress, pregnancy, and sample handling have direct and measurable effects on hormone values. For example, failure to record sampling time in cortisol or ACTH testing can result in misclassification of normal physiological variation as adrenal pathology. Similarly, renin–aldosterone ratio interpretation is highly dependent on posture and medication status, and prolactin measurement requires adequate rest prior to sampling. These are not laboratory limitations but communication gaps that originate at the point of test requisition. Medication interference represents another major but frequently overlooked issue. As outlined in [Table 3], agents such as biotin, glucocorticoids, oral contraceptives, thyroxine, antiepileptics, and antipsychotics can either alter true hormone concentrations or interfere directly with immunoassay methodologies. Without explicit documentation of such drugs, laboratories may report results that appear abnormal but are in fact pharmacologically influenced. This often leads to repeat testing, additional investigations, and unnecessary patient anxiety. Dynamic endocrine tests present even greater challenges. Procedures such as ACTH stimulation, dexamethasone suppression, oral glucose tolerance testing, and water deprivation testing require strict adherence to time-point sampling. In routine practice, the absence of structured fields for recording exact timings frequently renders samples difficult to interpret or completely unusable. Incorporating pre-printed time-point templates within the requisition form can substantially reduce such avoidable errors. The review also underscores that most currently used requisition forms are generic in nature and designed for routine biochemistry rather than hormone assays. They typically lack space for menstrual or obstetric history, medication checklists, fasting and posture information, and prompts for potential analytical interferences. This structural deficiency directly contributes to the pathway from incomplete requisition to diagnostic error, as illustrated in [Figure 1]. Upgrading the endocrine requisition form, as proposed in this review [Figure 3], represents a simple yet highly effective quality improvement measure. Introducing mandatory patient

identifiers, structured clinical history sections, medication tick-boxes, precise sample collection details, and dedicated dynamic test fields can significantly enhance the quality of information received by the laboratory. Furthermore, integration with Laboratory Information Systems (LIS) and Hospital Information Systems (HIS) offers an opportunity to electronically enforce completeness, generate alerts for missing data, and flag known drug–test interactions. Previous studies have demonstrated that such digital interventions markedly reduce pre-analytical errors and improve overall workflow efficiency. Importantly, the benefits of an upgraded requisition form extend beyond error reduction. Improved clinician–laboratory communication enhances diagnostic confidence, reduces turnaround time by minimizing clarifications and repeat sampling, and supports compliance with accreditation standards recommended by CLSI and other quality bodies. Ultimately, these improvements translate into better patient care, which is the primary goal of laboratory medicine. This review emphasizes that refining the requisition form does not require sophisticated technology or major financial investment. Rather, it requires thoughtful design aligned with the unique demands of endocrine testing. Even small structural modifications can have a substantial impact on diagnostic accuracy and patient safety.

CONCLUSION

Endocrine assays rely heavily on accurate pre-analytical information. The requisition form, though often overlooked, plays a key role in ensuring laboratories receive the details necessary for proper interpretation. Introducing structured sections for clinical history, medication intake, sample

timing, and dynamic test protocols can significantly reduce errors and support more accurate, consistent endocrine reporting. Investing effort in revising the requisition form is a simple yet highly effective step toward better diagnostic practice.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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