Adnexal Cyst Clinical Guidance Module

Executive Summary

The **Adnexal Cyst Clinical Guidance (CG) module** is a structured decision support application embedded within Microsoft Nuance PowerScribe. It provides radiologists with real-time, guideline-concordant recommendations for the evaluation and follow-up of adnexal cyst detected on pelvic ultrasound (US). The module encodes the complete decision logic from the Society of Radiologists in Ultrasound (SRU) 2009 Consensus Statement on management of asymptomatic ovarian and other adnexal cysts (Levine et al., Radiology 2010 256: 943-54).

The module operates within the PowerScribe CG framework, supporting input through dropdown selectors and image maps, with each selection mapped to a discrete lexicon element defined by the guideline. Inputs include cyst size, laterality, location, and sonographic appearance, while menopausal status is factored into the logic to generate follow-up recommendation. Based on the encoded rule pathways, the module automatically inserts the appropriate findings, impression, and citation text into the radiologist's report.

An interactive map within the module displays the main types and characteristics of adnexal cysts, with each terminal node representing a valid category. Selecting a node auto-populates the structured input fields and triggers output generation.

This document defines the design, logic structure, input specification, output schema, interaction model, and validation plan for the Adnexal Cyst CG module. It is intended for implementation stakeholders including clinical informaticists, software engineers, quality assurance specialists, and regulatory reviewers.

Clinical and Technical Scope

Clinical Scope

The module encodes the characterization and management framework defined in the Society of Radiologists in Ultrasound (SRU) 2009 Consensus Statement on management of asymptomatic ovarian and other adnexal cysts. It supports categorization of adnexal cysts identified during pelvic ultrasound examinations performed in women of reproductive age, early postmenopause, late postmenopause, or unknown menopausal status.

The decision logic accounts for both ovarian and extraovarian cystic findings encountered on pelvic ultrasound, incorporating physiologic and functional cysts, classic benign entities such as hemorrhagic cysts, endometriomas, dermoids, paraovarian and peritoneal inclusion cysts, and hydrosalpinx, with management recommendations stratified by menopausal status, cyst morphology (simple, complex, or indeterminate), and size thresholds as defined by the SRU consensus guideline.

The tool is designed for evaluation and structured follow-up of cystic adnexal lesions detected on ultrasound that are not clearly malignant but may warrant monitoring or additional characterization. Lesions within scope include:

- Normal ovaries with or without physiologic findings
- Functional and hemorrhagic cysts
- Dermoid cysts and endometriomas
- Paraovarian and peritoneal inclusion cysts
- Hydrosalpinx and other benign extraovarian cystic structures
- Cystic or mildly complex lesions stratified by size, locurality, internal echoes, septations, and vascularity
- Indeterminate cysts requiring short-interval follow-up for resolution or characterization Management pathways ranging from documentation only, periodic ultrasound follow-up, further cross-sectional imaging, or surgical consultation when indicated

The encoded logic adheres exactly to the SRU guideline without local modifications or institution-specific heuristics.

Technical Scope

The module is implemented with the PowerScribe CG framework and is accessible during report creation through macro trigger. Input is collected via a structured interface using dropdown menus and checkboxes, with each field linked to a defined lexicon element derived from the SRU guideline.

Generated output is inserted into the Findings and Impression sections as natural language text, including the appropriate management recommendation and optional citation to the SRU consensus statement (Levine et al., Radiology 2010; 256:943-954). The report content is dynamically assembled based on selected input, with grammatical variation to support narrative readability.

An optional interactive reference image map is available within the module interface, displaying the principal categories and characteristic appearance of adnexal cysts. Users can navigate this map directly by selecting lesion descriptors, which populate the structure input fields and trigger automated output generation.

Out of scope for this module:

- Customization of management recommendations based on patient-specific clinical context beyond menopausal status and cyst morphology.
- Audit trail or analytics features beyond native PowerScribe infrastructure.
- Automated multi-lesion summarization or prioritization logic.

Guideline Background and Source Authority

The Adnexal Cyst CG module is derived from the SRU Consensus Statement on the management of asymptomatic ovarian and other adnexal cysts, published in Radiology in September 2010 (Levine et al., Radiology 2010; 256:943–954). This consensus guideline defines the standardized terminology, size thresholds, and management recommendations for adnexal cysts incidentally detected on pelvic

ultrasound in asymptomatic, nonpregnant women. It provides a unified, evidence-based framework for distinguishing physiologic and benign cysts from those that warrant follow-up or further evaluation, with recommendations tailored to menopausal status, cyst morphology, and size.

Purpose of the Source Guideline

The SRU consensus guideline was developed to:

- Establish standardized ultrasound terminology for describing ovarian and extraovarian cystic lesions
- Define size and morphological thresholds for determining which cysts require documentation, follow-up, or further evaluation
- Provide evidence-based management recommendations stratified by menopausal status (reproductive age, early postmenopausal, and late postmenopausal)
- Reduce unnecessary follow-up and intervention for clearly benign or physiologic findings, while identifying lesions that merit additional imaging or surgical consideration

The SRU consensus represents a multidisciplinary effort by experts in radiology, gynecology, and pathology, and has been widely adopted in clinical practice as the standard reference for adnexal cyst management.

Implementation Scope within the Module

The module supports classification and follow-up recommendation generation for:

- Physiologic and functional cysts, including dominant follicles and corpus luteum.
- Classic benign cysts, including hemorrhagic cysts, dermoids, endometriomas, paraovarian cysts, peritoneal inclusion cysts, and hydrosalpinx.
- Simple cysts, stratified by size and menopausal status, with thresholds for documentation, annual follow-up, or further imaging.
- Complex or indeterminate cysts, including those with internal echoes, thin septations, or ambiguous features, which may warrant short-interval (6–12 week) follow-up to ensure resolution or stability.
- Cysts with concerning features, such as thick or irregular septations, mural nodules, or vascularized solid components, which should prompt consideration for surgical evaluation.

Each input and rule in the module maps directly to a lexicon term, measurement criterion, or decision branch defined in the SRU guideline.

Citation

Levine D, Brown DL, Andreotti RF, et al. *Management of Asymptomatic Ovarian and Other Adnexal Cysts Imaged at Ultrasound: Society of Radiologists in Ultrasound Consensus Conference Statement*. Radiology. 2010; 256(3):943–954. doi:10.1148/radiol.10100213

Available online: https://pubs.rsna.org/doi/10.1148/radiol.10100213

Data Inputs

The Adnexal Cyst Clinical Guidance module accepts a defined set of structured inputs corresponding to lesion characteristics outlined in the SRU consensus statement. All data are collected through a controlled interface using dropdown menus, an image map, and a numeric field. No free-text input is permitted to ensure data consistency and unambiguous decision logic traversal. Each field is linked to a discrete internal identifier and a defined permissible value set. The combination of inputs allows the system to determine the appropriate management recommendation based on cyst type, morphology, size, and menopausal status.

Input Field Definitions

See Table 1.

Decision Logic and Category Assignment

The Adnexal Cyst CG module encodes the complete management logic defined in the SRU consensus statement on the management of asymptomatic ovarian and other adnexal cysts. All decision pathways are implemented as deterministic logic trees.

The module accepts structured inputs and assigns a management recommendation, rather than a numeric category, based on predefined conditional rules derived directly from the SRU guideline. No probabilistic or user-overridable scoring is applied.

Each pathway integrates cyst type, size, and menopausal status to determine the correct recommendation, which may include:

- No follow-up required (physiologic or benign cysts)
- Ultrasound follow-up at a defined interval (e.g., 6–12 weeks or 12 months)
- Consider MRI for further evaluation
- Recommend surgical or gynecologic consultation

Inference Structure

- Logic is implemented as a branching rule engine
- Each terminal node resolves to a single management recommendation
- All pathways are mutually exclusive
- Decision nodes are deterministic
- No user overrides, probabilistic weighting, or manual scoring adjustments are permitted

Scope of Encoded Logic

The module supports:

- Classification of cystic and benign-appearing adnexal lesions, including physiologic, functional, and classic benign types

- Size-based stratification of management recommendations for simple cysts in reproductive-age, early postmenopausal, and late postmenopausal women
- Recognition of hemorrhagic cysts, with short-interval follow-up (6–12 weeks) recommended in appropriate populations
- Stable follow-up protocols for classic benign entities such as endometriomas and dermoids when not surgically removed
- Differentiation of extraovarian cystic lesions, including paraovarian and peritoneal inclusion cysts, which are managed according to clinical context
- Identification of indeterminate or complex cysts, characterized by septations, internal echoes, or mural nodules, triggering follow-up imaging or surgical consideration based on SRU morphology descriptors

All logic sequences, threshold values, and follow-up intervals are implemented exactly as described in the guideline, without modification. All encoded rules adhere strictly to SRU consensus thresholds for documentation, follow-up, MRI evaluation, or referral, ensuring reproducible, guideline-concordant management recommendations.

Generated Report Text

The Adnexal Cyst Clinical Guidance module automatically generates structured, guideline-concordant text for inclusion in the Findings and Impression sections of the radiology report. The output summarizes the cyst characteristics, provides an evidence-based management recommendation, and cites the SRU consensus statement as the authoritative source.

Output Structure

Each output instance includes:

- Findings including lesion description: concise summary of side, size, and morphology.
  Example: *"A simple cyst measures 2 cm in the left ovary."*
- Impression including management recommendation:
  Example: *"Simple cyst in the left ovary is almost certainly benign. In a woman of reproductive age, no imaging follow-up is recommended. In a post-menopausal woman, this should be followed yearly with ultrasound."*
- Citation (optional):
  "Recommendations for adnexal cyst follow-up per Society of Radiologists in Ultrasound 2009 consensus statement on management of asymptomatic and ovarian and other adnexal cysts (Levine et al., Radiology 2010 256: 943-54)."
- Exception handling: If required inputs are incomplete or the logic cannot resolve a final classification, no category or recommendation is displayed. Instead, the system shows a blank screen until all required and logically consistent inputs are provided and the logic completes successfully.

User Reference Material

Within the tool, the user has access to several references to aid in their use of the tool, both logistically and clinically.

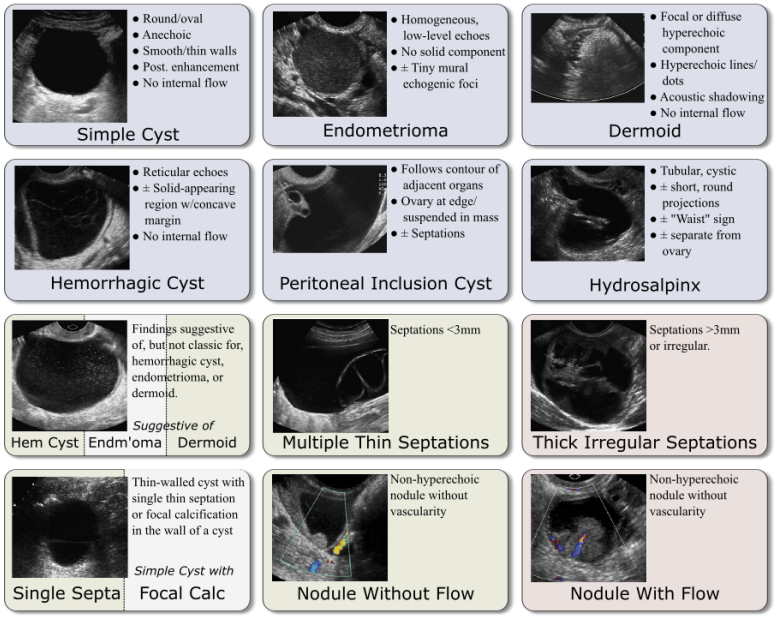
Management of Asymptomatic Ovarian/Adnexal Cysts Imaged at US

Description	Follow-up*
Cysts with benign characteristics	
Simple cysts *(includes ovarian and extraovarian cysts)*	Reproductive age: ≤ 5 cm: Not needed > 5 & ≤ 7cm: Yearly Postmenopausal (PM): > 1 & ≤ 7cm: Yearly** Any age: > 7 cm: Further imaging (e.g., MRI) or surgical evaluation
Hemorrhagic cyst	Reproductive age: ≤ 5 cm: Not needed > 5 cm: 6–12 week follow-up to ensure resolution Early PM: Any size: Follow-up to ensure resolution Late PM: Consider surgical evaluation
Endometrioma	Any age: Initial follow-up 6–12 weeks, then if not surgically removed, follow-up yearly
Dermoid	Any age: If not surgically removed, follow-up yearly to ensure stability
Hydrosalpinx	Any age: As clinically indicated
Peritoneal inclusion cyst	Any age: As clinically indicated
Cysts with indeterminate, but probably benign, characteristics	
Findings suggestive of, but not classic for, hemorrhagic cyst, endometrioma, or dermoid	Reproductive age: 6–12 week follow-up to ensure resolution. Postmenopausal: Consider surgical evaluation
Thin-walled cyst with single thin septation or focal mural calcification	Follow-up based on size and menopause status, same as simple cyst described above
Multiple thin septations	Reproductive age: Short interval follow-up (6-12 weeks) Postmenopausal: Consider surgical evaluation
Nodule (non-hyperechoic) without flow	Reproductive age: Short interval follow-up (6-12 weeks) Postmenopausal: Consider surgical evaluation or MRI
Cysts with characteristics worrisome for malignancy	
Thick (> 3 mm) irregular septations	Any age: Consider surgical evaluation
Nodule with blood flow	Any age: Consider surgical evaluation

*: Follow-up recommendations are for US unless otherwise indicated.
**: Some practices may choose a threshold size higher than 1 cm before recommending yearly follow-up.

From Society of Radiologists in Ultrasound Consensus Conference Statement (Levine, D, Andreotti, RF, Benacerraf, B, *et al. Radiology* 2010 **256**:943–54.

Module quick reference guideline.



Reference image map associated with the Appearance dropdown, available for interaction.

Display Label	Type	Permissible Values	Notes
Size (cm)	Numeric	> 0 cm	Required
Side	Choice	Left, Right, Midline	Required
Location	Choice	Ovary, Extra-ovarian Adnexa, Adnexa (Default)	Required
Appearance	Choice	Simple Cyst; Simple Cyst with Single Septation; Simple Cyst with Focal Calc; Hemorrhagic Cyst; Endometrioma; Dermoid; Hydrosalpinx; Peritoneal Inclusion Cyst; Suggestive of Hemorrhagic Cyst; Suggestive of Endometrioma; Suggestive of Dermoid; Cyst with Multiple Thin Septations; Cyst with a Nodule without Flow; Cyst with Thick, Irregular Septations; Cyst with a Nodule with Flow	Required; Image map available for direct selection
Menopausal Status	Choice	Reproductive Age; Early Post-menopausal; Late Post-menopausal; Unknown	Required
Thresholds (Global Values)	Constants	minimumSize = 1 cm; smallSize = 3 cm; mediumSize = 5 cm; maximumSize = 7 cm	Drives SRU size-based recommendations in rules

Table 1: Summary of input fields.

Appendix: Deployment Context

The Adnexal Cyst Clinical Guidance module is implemented within the PowerScribe Clinical Guidance framework. It integrates at runtime with the report composition interface, providing synchronous logic execution and output insertion without interrupting workflow continuity.

Runtime Environment

- Platform: PowerScribe (version compatibility to be specified by engineering)
- Module Type: Structured Clinical Guidance module (manual launch)
- Input Layer: Embedded structured UI rendered via the PowerScribe guidance framework
- Output Layer: Structured output translated to report-ready text and inserted into the Findings, Impression, and/or Citation sections

Invocation Pathways

- Manually triggered via macro, shortcut, or sidebar navigation.
- Automatically surfaced by PowerScribe logic in selected contexts (e.g., adnexal lesion mention detection, if configured).

Launches in-context within the active report. No navigation away from PowerScribe interface is required.

Testing Summary

The Adnexal Cyst Clinical Guidance module has undergone validation following implementation of the Society of Radiologists in Ultrasound (SRU) consensus logic. Testing confirmed alignment with the guideline, proper user interface behavior, and correct output generation. All testing was conducted in a non-production PowerScribe 2019 environment.

Testing Scope and Coverage

Validation included the following domains:

- **Deterministic Logic Execution**
  All cyst configurations defined in the SRU consensus were entered and verified to resolve to the correct management recommendation. Input-driven decision pathways produced deterministic, guideline-concordant results.
- **User Interface Behavior**
  Field sequencing, conditional display logic, required field enforcement, and input validation were confirmed. The interactive image map behavior was tested and shown to correctly prepopulate structured fields, display appropriate cyst morphology examples, and trigger logic execution.
- **Output Accuracy**
  Findings and impression text output were checked for proper formatting, correct insertion location, and exact match to the prescribed language for category and management recommendation.

Outcome

- All input scenarios tested returned correct and reproducible output.
- User interface functioned without error in structßured and flowchart-driven workflows.
- No critical bugs or logic defects were identified.

Appendix: Contributors and Authorship

All clinical logic used in this module is derived from the SRU consensus statement (Levine et al., Radiology 2010).

The development, testing, and documentation of the Adnexal Cyst Clinical Guidance module involved close collaboration between clinical subject matter experts, informatics leads, and engineering personnel. The following individuals contributed materially to the design, logic encoding, implementation, validation, and authorship of this specification.

Clinical and Informatics Leads

- **Tarik Alkasab, MD, PhD**
  Massachusetts General Hospital, Harvard Medical School
  Role: Clinical oversight, guideline fidelity assurance, technical-scientific advisory

Engineering and Module Development

- **Benjamin Ho**
  Massachusetts General Hospital
  Role: Module developer, output implementation, UI logic integration, flowchart mapping, logic tree encoding

Validation and Testing

- **Benjamin Ho**
  Role: Code-level testing, logic regression testing, output integrity validation
- **Tarik Alkasab, MD, PhD**
  Role: Full logic pathway testing, UI-state behavior verification

Additional Project Contributors

- **Bernardo Bizzo, MD, PhD**
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  Role: Documentation review