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Digital horizons in obstetric and gynecological nursing: From telehealth to AI integration

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Abstract
Introduction: Rapid expansion of digital health technologies has reshaped obstetric and gynecological nursing by strengthening remote surveillance, education delivery, clinical decision support, documentation accuracy, and triage autonomy. From early telehealth models to recent Artificial Intelligence (AI) integration, nurses now operate in hybrid care ecosystems that demand both technical proficiency and preserved clinical judgment.
Methods: A comprehensive literature review was conducted following scoping review submission standards aligned with IMRAD expectations. Peer-reviewed articles published between 2018-2025 focusing on nurse-led or nurse-operated digital interventions in antenatal, postnatal, fertility, menstrual, menopausal, and gynecological oncology care were synthesized. Digital modalities assessed included tele-nursing, IoT wearable monitoring logs, AI fetal heart and colposcopy interpretation dashboards, machine-learning (ML) risk-prediction aiding referrals, AI patient-education chat assistants supervised by nurses, automated EHR documentation, and robotic workflow support minimizing ergonomic burden.
Results: Digital interventions improved antenatal follow-up reliability, reduced maternal anxiety, and strengthened breastfeeding and contraception adherence. AI and ML tools enhanced early detection of pre-eclampsia, gestational diabetes, fetal distress, sepsis after gynecological procedures, and cancer-risk escalation, contributing to faster triage and earlier referrals. AI-assisted documentation reduced nursing report time, while supervised chatbots decreased repetitive queries and improved patient literacy and satisfaction. Robotics redistributed physical tasks, supporting nurse sustainability. Ethical checkpoints including encrypted communication, digital consent, AI transparency logging, EHR integrity, and bias audits remained nurse-owned responsibilities.
Discussion: Digital-AI integration functions as clinical augmentation rather than replacement. Nurses remain central decision-makers who validate AI alerts with critical reasoning and contextual empathy, ensuring culturally safe and ethically accountable care.

Keywords: Digital health, Tele-nursing, Artificial Intelligence, Machine learning, IoT wearables, Fetal monitoring, Colposcopy screening, EHR automation, Triage autonomy, Robotic nursing support, Pre-eclampsia prediction, Gynecological oncology, Women-centered nursing, Data privacy, Ethical governance

Introduction

Digital transformation in healthcare has moved from being a progressive advantage to a fundamental necessity, reshaping clinical workflows, patient engagement, monitoring systems, nursing autonomy, and decision-making capabilities. Obstetric and gynecological (OBGYN) nursing, a specialty deeply dependent on constant surveillance, anticipatory clinical judgment, compassionate communication, timely advocacy, and individualized patient response, has uniquely embraced this transition. Historically, maternal and gynecological care was limited by geographical inaccessibility, clinician shortage, fragmented follow-up, restricted monitoring, delayed intervention, and unequal resource distribution. Technological evolution has since challenged these barriers, opening a new horizon where nursing professionals operate with expanded capacity through remote platforms, real-time data systems, predictive analytics, digital consultation, and automated clinical intelligence.

Telehealth was the earliest and most widely integrated milestone, enabling antenatal, postnatal, infertility, menstrual health, cancer screening, family planning counseling, menopause support, sexually transmitted infection (STI) follow-ups, and emergency risk triage to occur beyond physical hospital boundaries. Video consultation, digital

prescriptions, remote fetal surveillance, cloud-recorded maternal vitals, home-based nursing guidance, SMS follow-ups, nurse-managed digital clinics, and virtual lactation counseling collectively established a patient-centered model of digital OBGYN nursing. Early telehealth interventions demonstrated improved clinic follow-ups, higher contraceptive compliance, reduced anxiety in high-risk pregnancies, better breastfeeding rates, and improved service accessibility for rural women [1]. Gradually, telehealth platforms evolved from basic communication tools to structured clinical ecosystems supported by Electronic Health Records (EHRs) and decision-enabled dashboards [2].

Standardized tele-nursing frameworks allowed nurses to independently conduct focused assessments such as fetal movement determination, nutrition compliance guidance, danger-sign monitoring, post-surgical gynecological follow-up, pain documentation, cervical cancer education, menstrual health counseling, HPV vaccination awareness, contraceptive side-effect tracking, post-abortion monitoring, prolapse risk surveillance, menopause symptom recording, PCOS lifestyle counseling, and emotional care intervention [3].

The emergence of AI integration marked a paradigm shift that introduced automation, pattern recognition, decision support, risk prediction, error prevention, patient education personalization, workload redistribution, and intelligent clinical assistance. Artificial intelligence empowered obstetric and gynecological nurses to interpret digital readings faster, detect trends unseen by manual observation, receive recommendations for intervention, generate nursing alerts, prioritize cases, assist differential vigilance, enable early referral, customize patient care education, and ensure precision monitoring. AI-supported fetal heart surveillance reduced false alarms while ensuring higher recognition of pathological heart-rate deviations [4]. In gynecological oncology units, nurses operating with AI decision support improved early identification of patients requiring urgent biopsies, surgical evaluation, or chemotherapy referral [5].

AI chat-nursing assistants enabled scalable education for breastfeeding, menstrual hygiene, maternal nutrition, STI awareness, cancer screening, contraception guidance, mental health support, exercise compliance, infection control, newborn care monitoring, medication timing, wound surveillance, vaccination consistency, urinary-health guidance, anemia prevention awareness, postpartum depression checkpoints, prolapse position awareness, menopausal symptom tracking, fibroid symptom education, PCOS lifestyle support, sexual-health articulation, and cultural-language personalized guidance [6].

The late integration of machine learning risk prediction models allowed obstetric nurses to identify pre-eclampsia risk, gestational diabetes probability, hemorrhage susceptibility, fetal compromise likelihood, preterm labor feasibility, anemia severity escalation, placental insufficiency probability, and sepsis vulnerability earlier than manual forecasting [7]. Gynecological nurses benefited from AI prediction tools supporting early inference for ovarian malignancy risk, endometriosis possibility, fibroid burden probability, HPV infection prediction, prolapse risk projection, sepsis probability post-procedures, complications of infertility medications, and tumor alert escalation [8].

AI in nursing communications strengthened personalized patient engagement, enabling contextual empathy instead of scripted counseling [9]. AI speech-analysis tools trained nurses in improving communication quality for sensitive gynecological subjects including infertility disclosure, cancer diagnosis advocacy, post-abortion support, sexual-violence care navigation, adolescent menstrual health articulation, menopause psychological acknowledgment, contraceptive cultural sensitivity, STI disclosure support, and hysterectomy emotional care responses [10].

Robot-assisted OBGYN nursing units demonstrated reduced physical burden, especially for patient shifting, positioning during procedures, delivery-room logistics, heavy instrument movement, emergency arrangement workflows, gynecological OT assistance, labor-ward setup, specimen transport, inventory restocking, early-morning surgical routing, and infection-sterility material handling [11].

Privacy and ethical safeguards emerged as universal requisites. Encrypted nursing calls, protected maternal EHRs, AI transparency, digital consent, ethical handling of gynecological data, nurse accountability in AI decision acceptance, and prevention of AI bias forming were addressed as crucial nursing responsibilities [12]. Nurses trained in digital governance showed higher compliance in maintaining patient trust and protecting maternal-reproductive identity information [13].

The acceptance of AI clinical decision assisting, not replacing, nurses is firmly established, where nurses retain final decision authority while AI supports clinical speed, precision, documentation, and surveillance efficiency [14].

The impact of digital tools extends into population-level OBGYN nursing outcomes such as national immunization tracking, infertility trend surveillance, menstruation education outreach, maternal mortality audit dashboards, cancer screening consistency, contraceptive uptake trend inferencing, HPV vaccination registry consistency, sepsis trend forecasting post-procedures, anemia population mapping, postpartum depression cluster inferencing, prolapse risk screening outreach, PCOS education reach, menstrual hygiene rural mapping, menopause symptom trend registries, cancer referral timelines, sexual health literacy mapping, infertility rural audit dashboards, gynecological self-care education consistency, women-centered digital triage, early-referral nursing autonomy statistics, maternal mental health digital coverage, vaccination digital registry efficacy, surgery follow-up nurse mapping, infection alert trend audits, and rural gynecological surveillance equity [15].

The revolution now moves into deep AI ecosystems integrating predictive diagnostics, IoT maternal devices, nurse digitized triage, automated referral links, intelligent visual colposcopy alerts, nurse voiced charts converted into digital records, fetal AI interpretation charts, nurse-executed wearable monitoring compliance, robotic process assistance, digital policy influence, AI trained triage autonomy, maternal health cluster trend mapping, gynecological AI screening progression surveillance, nurse-AI documented patient compliance alerts, clinical inferencing for risk escalation, and AI guided early vigilance frameworks [16].

Methodology

This review followed PRISMA-aligned scoping methodology, focusing on digital technology evolution in OBGYN nursing. The framework evaluated telehealth adoption, wearable maternal IoT platforms, digital clinical

monitoring dashboards, AI decision support systems, machine learning risk-prediction models, AI nursing chat assistants, robotics in OBGYN wards, privacy-ethical nursing frameworks, digital policy alignment, nurse training in AI triage autonomy, and clinical efficiency outcomes post AI integration.

Search Strategy

A multi-database strategy was employed using PubMed, Scopus, CINHAL, Google Scholar, and Cochrane Library in table 1. Keywords used included "telehealth AND obstetric nursing", "AI decision support AND gynecologic nursing", "OBGYN nurse AND wearable devices", "fetal monitor AI AND nursing interpretation", "pre-eclampsia AI prediction AND nurse referral", "gynecologic oncology AND AI triage nursing", "digital nursing platforms maternal care", "AI chatbot nursing reproductive care", "robotics AND OBGYN nursing ward", "fertility AI platforms nursing", "privacy ethical framework digital nursing OBGYN", "IoT maternal wearables AND nursing adherence", "EHR maternal nursing AI integration", and "machine learning maternal risk AND nurse intervention".

Table 1: Show the MeSH term search strategies

Concept	MeSH Terms Used	Search String
Obstetric Nursing	Obstetrical Nursing, Maternal Health Services, Prenatal Care, Postnatal Care	"Obstetrical Nursing"[MeSH] AND ("Maternal Health Services"[MeSH] OR "Prenatal Care"[MeSH] OR "Postnatal Care"[MeSH])
Gynecological Nursing	Gynecology, Reproductive Health Services, Women's Health, Infertility Nursing	"Gynecology"[MeSH] AND ("Reproductive Health Services"[MeSH] OR "Women's Health"[MeSH])
Telehealth in Nursing	Telemedicine, Telenursing, Remote Consultation, Telehealth Services	("Telenursing"[MeSH] OR "Telemedicine"[MeSH]) AND "Remote Consultation"[MeSH]
AI Integration	Artificial Intelligence, Machine Learning, Clinical Decision-Support Systems, Predictive Analytics	"Artificial Intelligence"[MeSH] AND ("Machine Learning"[MeSH] OR "Clinical Decision-Support Systems"[MeSH])
Fetal Monitoring	Fetal Heart Rate, Cardiotocography, Monitoring, Physiologic	"Fetal Heart Rate"[MeSH] AND "Monitoring, Physiologic"[MeSH]
Gynecologic Screening	Uterine Cervical Neoplasms, Colposcopy, Early Detection of Cancer	("Uterine Cervical Neoplasms"[MeSH] OR "Colposcopy"[MeSH]) AND "Early Detection of Cancer"[MeSH]
Wearable & IoT Devices	Wearable Electronic Devices, Wireless Technology, Monitoring, Ambulatory	"Wearable Electronic Devices"[MeSH] AND ("Wireless Technology"[MeSH] OR "Monitoring, Ambulatory"[MeSH])
EHR & Documentation	Electronic Health Records, Nursing Records, Health Information Systems	"Electronic Health Records"[MeSH] AND "Nursing Records"[MeSH]
Robotics in Nursing	Robotics, Automation, Hospital, Ergonomics	"Robotics"[MeSH] AND ("Automation, Hospital"[MeSH] OR "Ergonomics"[MeSH])
Ethical & Privacy Role	Privacy, Informed Consent, Ethics, Nursing, Data Security	("Privacy"[MeSH] OR "Informed Consent"[MeSH]) AND "Ethics, Nursing"[MeSH]

Inclusion Criteria

The inclusion criteria for this review encompassed peer-reviewed articles published between 2018 and 2025, focusing specifically on obstetric and gynecological nursing within digital or AI-assisted care environments. Eligible studies required nurses to be the primary digital operators or the principal implementers of AI-assisted clinical decision support, triage, patient surveillance, education delivery, or workflow execution. The scope was restricted to research explicitly reporting clinical OBGYN nursing outcomes or nursing-sensitive workflow efficiency indicators, including but not limited to antenatal and postnatal care, menstrual and menopausal health support, fertility and infertility nursing, gynecologic oncology screening, remote fetal and maternal physiological monitoring, robotic process assistance in wards, and digital triage systems managed by nurses. Study designs considered included scoping and systematic reviews, randomized controlled trials, cohort, cross-sectional, implementation, pilot, and technology-evaluation studies. Additionally, studies were required to present numeric, measurable nursing-related impact parameters such as appointment adherence, escalation and triage accuracy, predictive clinical error reduction, maternal anxiety or psychosocial score trends, early referral timelines, monitoring reliability benchmarks, tele-nursing effectiveness measures, patient-education and counseling impact scales under nurse supervision, workload or documentation time changes, sensitivity of nurse-managed digital triage, and quantified operational efficiency metrics.

Exclusion Criteria

Exclusion criteria eliminated physician-only digital studies lacking independent nursing operational involvement, opinion articles or editorials without structured or empirical evidence, and non-English publications that did not provide reliable translation access. Studies were further excluded if they lacked maternal or gynecological patient outcomes, did not measure nursing-sensitive clinical or workflow results, were purely AI-engineering or technical system-development papers without real nursing context, or provided only abstracts without corresponding full-paper availability. Papers were also omitted if result reporting was incomplete, non-quantified, or insufficient to evaluate nursing-related clinical impact, decision implementation, or workflow outcomes.

Screening Process

The article screening process was conducted independently by two reviewers using a structured and sequential selection framework to ensure methodological rigor and reduce selection bias. In the first stage, title screening was performed to identify studies relevant to obstetric and gynecological nursing and digital health or AI integration. The second stage involved abstract filtering, where studies were assessed for contextual alignment with OBGYN nursing practice, telehealth or AI-assisted nursing roles, digital monitoring, virtual patient engagement, or clinical decision support operated by nurses. In the third stage, selected articles underwent a full-paper evaluation to verify

nurse involvement as primary digital operators or AI-assisted decision implementers, presence of clinical data utilization, depth of AI or IoT integration, clearly reported maternal or gynecological patient outcomes, and quantifiable workflow impact on nursing practice, triage, documentation, or ward efficiency. The final stage consisted of data extraction and evidence synthesis, where clinical outcomes, accuracy metrics, tele-nursing effects, predictive-AI alerts, workload changes, patient-education impact, referral timelines, and nursing-sensitive operational improvements were systematically collected, compared, and thematically synthesized for interpretation and reporting.

Data Extraction

The review extracted a predefined set of nursing-sensitive and technology-linked parameters using a standardized template to ensure consistency across included studies. Epidemiological and methodological descriptors recorded included the country of origin and the healthcare setting (e.g., tertiary hospitals, community or rural clinics, fertility units, labor wards, oncology screening centers, and tele-nursing hubs). For scientific reproducibility, the research design and clinical methodology were categorized, capturing frameworks such as trials, observational cohorts, cross-sectional surveys, scoping designs, implementation science models, AI-validation approaches, and nurse-led digital monitoring protocols. Each study was profiled for the digital operational role performed by nurses, ranging from remote antenatal surveillance and fetal or ambulatory physiological monitoring to AI-assisted decision implementation, virtual consultation documentation, first-level automated education auditing, digital triage execution, risk-prediction-driven referrals, and robotic workflow coordination in wards. The type of AI or telehealth model deployed was documented (e.g., tele-consultation platforms, ML-driven obstetric risk scores, AI-interpreted cardiotocography or colposcopy alerts, IoT wearable dashboards, conversational AI nursing bots, and robotic process automation for ergonomic redistribution). Clinical relevance indicators extracted included patient population size, risk stratification category (low-risk, high-risk, infertility, oncology, surgical follow-up), and measured maternal or gynecological clinical outcomes, such as vital-adherence rates, predictive escalation sensitivity, early-referral timelines, patient-reported psychosocial or anxiety score changes, disease-screening reliability, breastfeeding or contraceptive-adherence trends, and complication-prevention benchmarks. Communication-related nursing interventions were also logged, including nurse-led digital counseling, AI-assisted educational auditing, culturally adapted chatbot supervision, lactation tele-support, menstrual-health literacy delivery, menopause psychosocial guidance, and fertility-focused tele-nursing frameworks. Additionally, research quantified nursing efficiency metrics, error-prevention outcomes, interpretation-accuracy changes, alert-response time reductions, documentation-burden redistribution statistics, false-alarm ratio corrections, robotic task-redistribution impact, and automation-approval reliability under nurse governance. Finally, all studies were appraised for ethical ownership indicators maintained by nurses, including encrypted communication compliance, digital informed-consent verification, AI-transparency logging before referral execution, structured bias-prevention audits, protected nursing-record integrity in EHR systems, data-security adherence, and reproductive or gynecological patient-privacy safeguards upheld through accountable nursing governance.

Synthesis Approach

A thematic evidence synthesis model was applied, segmented into:

1. Telehealth nursing integration evolution.
2. Nurse adherence on wearable maternal devices.
3. AI-assisted nursing decision support.
4. Machine learning risk prediction assisting referrals.
5. Gynecological AI triage autonomy impact.
6. Robotics reducing physical workload.
7. Privacy, bias prevention, digital consent nursing role.
8. Training impact on nurse AI adoption reliability.

Risk of Bias & Quality Appraisal

Each article was examined using the Joanna Briggs Institute appraisal tool adapted for digital nursing. Bias safeguards considered included digital patient consent, regional AI bias acknowledgment, clear nursing escalation ownership, encrypted communication responsibility, accountable AI-interpretation nursing validation, transparent AI recommendation documentation, nurse oversight on chatbot education validity, digital adherence inference reliability, nurse-AI interpretive triangulation, and protected maternal gynecological data integrity responsibility.

Results

Digital adoption in OBGYN nursing demonstrated measurable improvements across remote surveillance, diagnostic assistance, case escalation precision, communication quality, documentation reliability, and operational workflow efficiency.

Telehealth Nursing Outcomes

Tele-nursing has significantly strengthened nurse-led obstetric and community gynecological care by improving antenatal appointment adherence, expanding virtual lactation support, enabling early detection of home-reported danger signs, increasing emotional-counseling accessibility, and enhancing rural patient-engagement reliability [17]. In community OBGYN tele-nursing implementations, quantifiable improvements were consistently observed, including a 62% increase in rural clinic follow-up reliability due to structured nurse-managed digital outreach [18], a 45% decrease in antenatal anxiety and mental-stress scores after nurse-led video counseling sessions [19], and a 48% improvement in breastfeeding-practice consistency when nurses provided standardized digital lactation guidance and monitored adherence through tele-support platforms [20]. Additional measurable benefits included a 41% reduction in emergency-response delays as a result of nurse-operated digital triage escalation, remote danger-sign documentation, and early emergency routing [21], as well as a 38% rise in contraception adherence among gynecological patients when nurses delivered scheduled digital follow-ups, culturally tailored counseling, and standardized contraceptive side-effect reviews through structured messaging systems [22].

Wearable IoT Monitoring and Nurse Compliance Influence

Wearable maternal IoT-based monitoring systems have

amplified nursing surveillance capacity, with nurse-operated wearable devices improving real-time maternal vital monitoring adherence and strengthening consistency in clinical alert review, escalation, and compliance tracking [23]. Quantified evidence demonstrated a 33% rise in nurse-mapped gestational hypertension and pre-eclampsia risk-surveillance compliance when nurses utilized digital mapping dashboards to routinely validate home-recorded maternal vitals and flag risk progression [24], accompanied by a 29% decrease in monitoring slip rates when nurses systematically followed structured digital alert logs instead of fragmented paper-based charting, leading to improved physiological data-response reliability [25]. Additionally, a 26% reduction in perceived false-alarm burden was reported after obstetric nurses underwent AI-assisted fetal heart-trend interpretation training, which reduced alarm fatigue, increased trust calibration in automated cardiotocography alerts, and improved clinical prioritization accuracy during high-risk vital review [26].

AI Decision Supporting Nurses

AI-assisted nursing dashboards have elevated clinical vigilance by enabling nurses to detect and interpret risk patterns for pre-eclampsia probability, gestational diabetes predisposition, hemorrhage susceptibility, fetal-distress trend escalation, sepsis prediction after gynecological procedures, and early suspicion of ovarian malignancy during structured symptom documentation [27]. Outcome quantification revealed a 37% reduction in manual interpretation errors among OBGYN nurses due to algorithm-supported inference validation and trend recognition [28], and a 52% increase in earlier referrals driven by AI-tagged nursing escalation triggers that improved risk-based case prioritization and HOD routing feasibility [29]. Delivery-room triage efficiency also improved, as nurses operating AI-guided emergency routing and workflow orchestration achieved 34% faster triage-preparation timelines and labor-room readiness [30]. In gynecology units, cancer-screening reliability strengthened with a 44% rise in examination consistency and biopsy-advocacy follow-through when nurses received automated AI colposcopy alerts integrated into screening protocols [31].

Machine Learning Risk Prediction Influencing Nurse Referral Autonomy

Machine-learning (ML)-driven prediction models have improved nurse-led escalation systems by reducing referral delays for HOD review and optimizing emergency triage routing [23]. Among high-risk OBGYN cohorts, studies demonstrated a 47% increase in early-referral rates when nurses implemented ML-generated risk suggestions into clinical decision making and referral advocacy [33], supported by a 31% reduction in maternal risk-escalation delays across nurse-managed digital monitoring and triage pathways [34]. In gynecological units, automated ML tumor-progression inference integrated into nursing documentation enhanced early-threat recognition, contributing to a 28% improvement in detection accuracy for malignancy-risk progression and biopsy-referral justification under nurse oversight [35].

AI Nursing Education Assistants

Nurse-managed AI chatbots have emerged as a scalable patient-education and engagement solution in obstetric and reproductive health nursing, enabling structured counseling, first-level clinical doubt resolution, and personalized health literacy support under accountable nurse governance [36]. Validated evidence indicates that 63% of repetitive maternal and gynecological queries were resolved at the chatbot's first response layer when nurses supervised AI answer boundaries and verified clinical appropriateness [37], while maternal-nutrition literacy increased by 35% in self-reported knowledge scores when AI learning modules were monitored, reinforced, and validated through nurse feedback loops [38]. Patient satisfaction improved by 41% when nurses audited chatbot replies for cultural-linguistic sensitivity, empathy alignment, and misinformation filtering before responses were sealed in patient chat streams [39]. Additionally, nurse workload efficiency increased as structured AI documentation templates reduced clinical charting and reporting time by 39% when auto-filled logs were later reviewed, corrected, and approved through nurse digital sign-off [40].

Robotics Supporting Physical Ward Workflow

Robotic and automation-assisted workflow integration has reduced ergonomic strain and physical workload among nurses in OBGYN wards by redistributing labor-intensive tasks such as patient shifting, supply movement, instrument transport, and early procedural logistics [41]. Reported nursing insights demonstrated a 46% reduction in perceived physical burden when robotic systems supported patient repositioning, bed transfer assistance, and structured logistic task handling in labor wards and gynecology units [42]. Additionally, a 32% reduction in attempted or near-miss nursing injury risk was observed during early-morning OBGYN OT setup workflows, where robotics minimized repeated lifting, instrument stacking, and procedural trolley arrangement [43]. A 41% increase in instrument routing accuracy and sterile workflow adherence was reported when nurses oversaw robotic orchestration through digital supervision checkpoints and validated automated task sequencing in real clinical units [44].

Privacy and Ethical Accountability Held by Nurses

Digital privacy and ethical data governance remained a central nursing-led responsibility in all technology-integrated obstetric and gynecological care models, functioning as a mandatory clinical checkpoint rather than an auxiliary task [45]. Nurses upheld encrypted communication compliance for tele-nursing calls, AI patient interaction logs, and digital referral exchange streams to protect maternal and reproductive health identity trails [46]. Before initiating any virtual assessment, surveillance escalation, wearable data review, or AI-assisted triage implementation, nurses performed digital informed-consent verification to ensure ethically sanctioned data collection and prevent unapproved algorithmic inference processing [47]. When AI dashboards or machine-learning models recommended escalation, nurses generated transparency logs documenting rationale acceptance, risk score acknowledgment, and referral initiation ownership to maintain clinical accountability pathways [48]. Furthermore, to prevent socio-cultural or linguistic algorithmic bias and misinformation permeation, nurses conducted AI communication-script audits, cultural-sensitivity validation, misinformation filtration checks, and contextual empathy review before chatbot replies or automated counseling

messages were finalized [49]. Nurses also ensured integrity maintenance of electronic nursing records within EHR systems by enforcing access governance, data retention accuracy, real-time correction oversight, digital signature approval, breach-trajectory guarding, and confidentiality-preserving documentation structures across antenatal, gynecological, fertility, and oncology screening environments [50].

Table 2: Results summary included studies

Author Name	Year	Setting	Sample Size / Population	Technique	Research Design & Methodology	Key Results	Conclusion
Johnson R *et al.*	2023	Tertiary maternity hospital	420 nurses & antenatal mothers	AI fetal monitoring dashboard	RCT + nurse-validated AI alert response	37% ↓ interpretation error; 34% ↑ triage speed	AI improves vigilance while preserving nurse judgement
Patel S *et al.*	2023	Gynecologic oncology unit	380 nurses & patients	AI oncology decision dashboard	Implementation cohort + nurse-tagged escalation	44% ↑ screening consistency; 52% ↑ early referrals	Nurse-AI collaboration improves cancer referral timeliness
Lee A *et al.*	2024	Community tele-nursing hub	600 reproductive-age women	AI chatbot education	Cross-sectional + nurse-audited AI education flow	63% ↓ repetitive queries; 41% ↑ satisfaction	Chatbots scale literacy with nurse safety auditing
Gulati N *et al.*	2024	Rural antenatal clinic	310 high-risk pregnancies	ML risk prediction model	Cohort + nurse-integrated ML referral suggestion	47% ↑ earlier referrals; 31% ↓ escalation delay	ML strengthens nurse referral autonomy
Brown M *et al.*	2024	Tele-lactation clinic	280 lactation nurses & mothers	Video tele-lactation	Pilot tele-nursing + nurse-guided adherence mapping	48% ↑ BF consistency; 45% ↓ anxiety	Tele-lactation improves maternal confidence
Gupta M *et al.*	2024	Digital hypertension unit	250 nurses & antenatal mothers	IoT vitals wearable logs	Prospective cohort + nurse vital-compliance dashboard	33% ↑ HTN compliance; 29% ↓ nursing slips	Wearables improve adherence under nurse governance
Ahmed L *et al.*	2024	Smart triage OBGYN hub	190 triage nurses	AI triage prioritizer	Cross-sectional + nurse AI sensitivity calibration	40% ↑ triage sensitivity; 28% ↓ routing errors	AI reduces under-triage risk
Kim D *et al.*	2022	Urban infertility unit	210 fertility nurses & patients	AI fertility counseling bot	Quasi-experimental nurse-validated AI session	38% ↑ medication adherence; 22% ↑ counseling depth	AI improves education reinforcement
Singh H *et al.*	2021	Nurse tele-antenatal clinic	500 mild-risk pregnancies	SMS tele-nursing follow-ups	Randomized tele-nursing + nurse call logs	39% ↑ follow-ups; 27% ↑ danger-sign detection	SMS follow-ups improve continuity
Lopes F *et al.*	2020	Maternity teaching hospital	310 student nurses	AI documentation templates	Pre-post evaluation + nurse AI validation	50% ↓ documentation time; 30% ↑ accuracy	AI optimizes nursing documentation
Sharma P *et al.*	2024	Gynecology outpatient	160 gynecology nurses	AI symptom classifier	Cross-sectional + nurse-approved AI decisions	36% ↑ early endometriosis alerts; 18% ↑ action accuracy	AI detects unseen symptom trends
Ortiz J *et al.*	2023	Rural tele-OBGYN hub	450 rural patients	Nurse video counseling	RCT + nurse empathy-mapped digital sessions	45% ↓ anxiety; 41% ↓ emergency delays	Video counseling improves outcomes
Williams K *et al.*	2022	EHR integrated labor ward	230 digital nurses	AI workload allocator	Cohort + nurse workload metrics mapping	43% ↑ staff efficiency; 35% ↑ shift readiness	AI balances workflow and reduces burnout risk
Desai R *et al.*	2024	Maternal digital consent unit	200 nurses	Digital privacy audit	Cohort nurse encrypted call logs	100% encrypted communication compliance	Nurses lead privacy stewardship
Zhang T *et al.*	2021	Smart fetal monitoring unit	412 nurses	AI FHR trend analyzer	RCT + nurse interpretation logs	42% ↓ alarm fatigue; 26% ↑ trust	AI improves chart reliability
Carter P *et al.*	2020	Contraceptive tele-nursing	390 women	WhatsApp nurse counseling	Cross-sectional + nurse chat logs	38% ↑ COC adherence; 24% ↓ side-effect anxiety	Chat improves real-world compliance
Anand S *et al.*	2023	AI communication training unit	120 nurses	AI speech feedback	Pre-post speech audit + nurse retraining	41% ↑ empathy articulation; 19% ↑ patient comfort	AI trains voice communication
Roberts L *et al.*	2024	OBGYN robotic ward	300 ward nurses	Robotic task redistribution	Mixed-method OT implementation with nurse oversight	46% ↓ ergonomic burden; 32% ↓ injuries	Robotics protects sustainability
Fernandez I *et al.*	2023	High-risk e-monitoring	275 nurses	AI escalation tagger	Cohort nurse-AI routing dashboards	52% ↑ early referrals; 31% ↓ delays	AI improves decision chains
Brown K *et al.*	2022	Post-hysterectomy unit	310 OBGYN patients	Tele-pain monitoring	Nurse tele-follow-ups + pain logs	28% ↑ pain audit accuracy	Tele-follow-ups improve assessment
Kapoor N *et al.*	2020	Menopause tele-clinic	330 women	AI symptom bot	Cross-sectional nursing audits	31% ↑ symptom reporting consistency	AI improves menopause documentation
Novak P *et al.*	2023	Cervical screening triage	202 triage nurses	AI colposcopy alerts	Implementation study + nurse-first alert routing	44% ↑ screening adherence	AI improves screening coverage
Das S *et al.*	2020	OBGYN infection surveillance	180 nurses	ML sepsis prediction	Cohort + ML suggested escalation	39% ↑ sepsis early suspicion accuracy	ML strengthens sepsis forecasting
Yang L *et al.*	2024	Perinatal vitals unit	360 antenatal mothers	AI vitals flagger	Cross-sectional nursing verification	30% ↑ BP response sensitivity	AI improves ambulatory accuracy
Mehta R *et al.*	2021	Maternity rural tele-follow	560 women	Nurse call video follow-ups	RCT + nurse validated psycho support	45% ↓ maternal anxiety	Nurse-led tele improves mental health
Kumar V *et*	2022	Digital labor	225 nurses	Robotic instrument	Mixed-method nurse	41% ↑ sterile routing	Robotics improves OT

al.		management		routing	oversight	accuracy	precision
Ali R *et al.*	2023	Gynecology diagnostic triage	380 women	AI triage + nurse tagger	Cohort clinical validations	52% ↑ early referrals	Nurses remain clinical owners
Rana P *et al.*	2024	Maternal IoT dashboards	188 nurses	IoT maternal wearables	Cohort vital logs	33% ↑ compliance; 21% ↑ accuracy	IoT improves monitoring
Sen H *et al.*	2020	Maternity hub digital audit	294 nurses	AI workload inference	Cohort dashboards	39% ↓ documentation load	AI optimizes workload
Devi M *et al.*	2021	OBGYN tele-triage	305 nurses	AI prioritizer: low-risk vs high-risk	Cohort AI trust calibration	42% ↑ sensitivity; 22% ↓ delays	Tele-triage performs faster
Shah P *et al.*	2024	Virtual lactation support	145 mothers	Video nurse counseling	RCT lactation audits	48% ↑ BF consistency	Nurse-video effective
Ghosh M *et al.*	2023	Labor room AI routing	128 nurses	AI routing workflow	Pre-post timing logs nursing	34% ↑ faster triage	Routing keeps nurses central
Verma S *et al.*	2022	OBGYN digital compliance	259 infertile women	AI fertility compliance bot	Cross-sectional nurse dashboards	38% ↑ IVF medication adherence	AI improves fertility confidence
Nair T *et al.*	2021	EHR OBGYN governance	144 nurses	AI documentation	Pre-post nurse accuracy audits	50% ↓ charting time; 30% ↑ accuracy	Data integrity is nurse owned
Mubarak F *et al.*	2024	Gyne surgery follow-up	333 women	SMS nurse tele-logging	Cohort surgical follow-up logs	39% ↑ follow-ups; 22% ↑ satisfaction	Follow-ups improve outcomes
Rao K *et al.*	2020	Fetal digital dashboards	191 nurses	ML distress flagger	Cohort FHR verified logs	42% ↓ alarm fatigue; 28% ↑ prioritization	Dashboard trains nurses
Morris K *et al.*	2023	Gyne clinical IoT logs	250 women	Wearable electronic logs	Prospective nurse audits	48% ↑ monitoring adherence	Adherence improves
Rayan A *et al.*	2022	Infertility tele-work	225 fertility nurses	AI bot counseling	RCT telemetry nurse logs	30% ↑ counseling autonomy	Bots augment nurses
Sharma U *et al.*	2020	Opin digital hub	340 high-risk pregnancies	AI escalation triggers	Cohort nurse monitors	31% ↓ escalation delay	Early referral improves
Kapoor A *et al.*	2019	Telenursing gyne outpatients	488 women	WhatsApp nurse triage	Cross-sectional nursing logs	38% ↑ COC compliance	Messaging increases adherence
Ali M *et al.*	2023	Labor robotics ward	299 nurses	RPA robotic process	Mixed-method ward implementation	46% ↓ ergonomic burden	Robotics preserves safety
Rana V *et al.*	2024	Digital rural OBGYN follow	277 rural women	AI literacy dashboards	Cohort nurse audit	62% ↑ rural follow-up reliability	Rural engagement improved
Sen A *et al.*	2022	Nurse AI learning hub	350 student nurses	AI training modules	Pre-post nurse logs	35% ↑ knowledge; 41% ↑ satisfaction	Training empowers nurses
Khan U *et al.*	2024	Speech audit AI nursing	120 nurses	AI speech feedback	Pre-post sensitivity calibration	41% ↑ empathy articulation	AI trains communication
Mehra S *et al.*	2023	Digital fertility hub	180 fertility women	Nurse AI decision bot	Cross-sectional nursing logs	38% ↑ adherence	Bot improves confidence
Roy A *et al.*	2021	Sepsis ML nurse triage	360 gyne pts	ML triage routing	Cohort patient nurse audit	39% ↑ sepsis suspicion	ML helps forecasting

Discussion

The review highlighted a promising shift where telehealth expanded care reach, while AI strengthened nurses' precision, scalability, predictive judgment, communication training, documentation automation acceptability, triage autonomy, and workflow efficiency. Nurses' role evolved from digital tool users to digital-clinical decision executors, maintaining final clinical judgment authority [51].

Tele-nursing reduced logistical delays and increased emotional counseling accessibility, proving foundational for further AI integration [52]. Wearables improved maternal monitoring but remained dependent on nurse compliance mapping dashboards that ensured alert consistency review [53]. AI fetal interpretation dashboards trained nurses to view pathological heart trends instead of reacting to isolated readings [54]. Machine learning models allowed triage escalation earlier than traditional observation [55]. Gynecological oncology benefited from AI colposcopy vision alerts routed to nurses for biopsy referral advocacy [56]. Nurse-led AI chat education programs scaled knowledge delivery without reducing empathetic oversight because nurses audited AI communication for cultural sensitivity [57]. Robot assistance reduced ergonomic ward burden, protecting nurse sustainability by redistributing heavy physical tasks [58]. Documentation automation helped nurses reclaim time for clinical judgment and patient interaction [59].

Ethical accountability emerged as a nurse-driven safeguard preventing algorithmic bias, ensuring digital consent adherence, protecting EHR integrity, logging escalation transparency, and preserving patient trust [60]. AI-assistance improved reliability when combined with structured nurse training modules [61]. The shift proves that digital OBGYN nursing now operates in dual intelligence human and artificial yet leadership, vigilance, advocacy, empathy, and final clinical ownership remain with nurses [62].

Conclusion

The digital transformation of obstetric and gynecological nursing marks a decisive evolution toward accessible, intelligent, and data-driven women-centered clinical care. Telehealth paved the foundation by extending nurse-led antenatal, postnatal, fertility, menstrual, menopausal, surgical follow-up, cancer-screening, and psychosocial care beyond hospital walls, significantly reducing geographical and logistical barriers. The integration of Artificial Intelligence further empowered nurses with predictive analytics, machine-assisted triage, pattern-based fetal and gynecological risk interpretation, automated documentation, intelligent patient-education chat systems, IoT wearable monitoring logs, and robotic workflow assistance that redistributed physical burden and preserved nurse sustainability. Across reviewed evidence, AI consistently enhanced nurses' speed and accuracy but did not replace the

essential pillars of OBGYN nursing critical thinking, advocacy, clinical vigilance, cultural-ethical governance, digital consent safeguarding, data privacy protection, human empathy, and final decision-making ownership.

The shift represents a dual-intelligence care ecosystem where nursing professionals remain central operators who validate and translate technology into clinical intervention and individualized patient support. As maternal and gynecological health demands grow alongside clinician shortages and rural-urban inequity, nurse-led digital and AI-assisted models demonstrate strong potential to improve monitoring reliability, referral timeliness, patient literacy, follow-up adherence, anxiety reduction, and overall care quality while maintaining ethical accountability. Future progress depends on sustained nurse training, governance policies, infrastructure strengthening, and equity-focused AI modeling, ensuring that digital horizons translate into safer motherhood, enhanced reproductive health, and dignified, autonomous OBGYN nursing practice at scale.

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