DATA QUALITY ASSESSMENT REPORT BY Joel Kojo Fofoh

MEDTRACK GHANA – PATIENT APPOINTMENT DATABASE REVIEW

MedTrack Ghana is currently experiencing operational challenges including failed SMS reminders, duplicate patient reporting, and unsuccessful billing transactions. A review was conducted on a sample dataset of 50 patient appointment records to assess data quality issues contributing to these problems.

This report identifies violations across the six core data quality dimensions: Accuracy, Completeness, Consistency, Timeliness, Validity, and Uniqueness evaluates their business impact, and proposes actionable solutions to improve system reliability and operational efficiency.

IDENTIFIED DATA QUALITY ISSUES

1. Accuracy Violation

Example:
P002, Ama Serwa, 244789012, 15/10/2025, dr. osei, paid

The phone number 244789012 is likely inaccurate because it is missing the leading zero required for Ghanaian phone numbers (e.g., 0244091232).

Issue Identified: Incorrect contact information.

2. Completeness Violation

Example:
P004,, 0555234567, 2025-10-17, Dr. Mensah, Paid

The PatientName field is missing.

Issue Identified: Required field left blank.

3. Consistency Violation

Examples:

- Doctor names:

- Dr. Osei
- dr. osei

- Payment status:
  - Paid
  - paid

- Date formats:
  - 2025-10-15
  - 15/10/2025
  - 10/16/2025

Issue Identified: Same data represented in multiple formats.

4. Timeliness Violation

Example:
Mixed and ambiguous date formats such as 10/16/2025.

This format may be interpreted differently (MM/DD/YYYY vs DD/MM/YYYY), which could result in incorrectly scheduled appointments.

Issue Identified: Potentially misdated or wrongly interpreted appointment records.

5. Validity Violation

Example:
244789012

Ghanaian phone numbers must follow a 10-digit format starting with "0". This entry does not follow expected structural rules.

Issue Identified: Data does not conform to format standards.

6. Uniqueness Violation

Example:
P001, Kwame Mensah, 0244123456, 2025-10-15, Dr. Osei, Paid
P001, Kwame Mensah, 0244123456, 2025-10-20, Dr. Adjei, Pending

The same PatientID appears multiple times without clear differentiation logic.

Issue Identified: Duplicate patient records causing potential double counting.

BUSINESS IMPACT ANALYSIS

1. SMS Reminder Failures (Operations Impact)

- Invalid or inaccurate phone numbers prevent reminder delivery.
- This leads to missed appointments and revenue loss.
- Affects: **Operations Team**

2. Incorrect Patient Reporting (Clinical & Management Impact)

- Duplicate PatientIDs inflate patient counts.
- Reports may show misleading performance metrics.
- Affects: **Clinical Operations & Management**

3. Billing Failures (Finance Impact)

- Inconsistent payment status formatting (Paid vs paid) may break billing automation rules.
- Failed payment tracking affects revenue reconciliation.
- Affects: **Finance Department**

4. Appointment Scheduling Errors (Operations & Clinical Impact)

- Mixed date formats may cause appointments to be scheduled on incorrect days.
- Could lead to doctor overbooking or missed consultations.
- Affects: **Clinical & Operations Teams**

5. Patient Record Integrity Risks (All Departments)

- Missing patient names reduce traceability.
- Incomplete records undermine trust in the system.
- Affects: **All Business Functions**

RECOMMENDED SOLUTIONS FOR THE THREE MOST CRITICAL ISSUES

Critical Issue 1: Invalid Phone Numbers

Technical Solution:

- Implement input validation rules enforcing Ghanaian phone number format (10 digits, starting with 0).
- Add automated format correction where possible.

Responsible Role:

- Backend Developer / Database Administrator

Verification Method:

- Run validation test cases.
- Monitor SMS delivery success rate before and after implementation.

Critical Issue 2: Duplicate Patient Records

Technical Solution:

- Enforce a database uniqueness constraint on PatientID.
- Implement duplicate detection scripts during data import.
- Introduce audit logs for repeated entries.

Responsible Role:

- Database Administrator
- Backend Developer

Verification Method:

- Compare duplicate count metrics before and after fix.
- Run a test insertion with duplicate PatientID to confirm rejection.

Critical Issue 3: Inconsistent Date and Status Formats

Technical Solution:

- Standardize date format to ISO 8601 (YYYY-MM-DD).
- Use dropdown selection for PaymentStatus to restrict values.
- Implement automatic normalization scripts.

Responsible Role:

- Backend Developer
- UI/UX Designer (for input controls)

Verification Method:

- Review database entries after deployment.
- Confirm uniform formatting in exported reports.

5. Specialization Perspective (UI/UX Focus)

From a UI/UX perspective, the biggest risk of poor data consistency is **loss of user trust and system credibility**.

When dashboards display inconsistent doctor names, duplicate patient counts, or incorrect billing statuses, users lose confidence in the system. Clinical staff may begin relying on manual processes instead of digital tools, defeating the purpose of digital transformation.

Poor consistency also:

- Reduces usability
- Increases cognitive load
- Creates confusion in reporting interfaces
- Leads to decision-making errors

Design systems should enforce structured inputs (dropdowns, masked inputs, date pickers) to prevent inconsistency at the source.

6. Conclusion

The analysis identified violations across all six core data quality dimensions: Accuracy, Completeness, Consistency, Timeliness, Validity, and Uniqueness. These issues directly contribute to operational inefficiencies, failed SMS communications, duplicate reporting, and billing errors.

Addressing these problems requires a combination of technical controls (validation rules, database constraints), process improvements (data entry standards), and user interface safeguards (structured input fields).

Improving data quality will significantly enhance operational reliability, financial accuracy, and overall trust in MedTrack Ghana's digital systems.