Claims

1. A computer-implemented method for processing healthcare insurance claims using an AI-powered platform, the method comprising:

   a. Receiving clinical data from an electronic health record (EHR) system in a standardized format, including patient information and records of medical services or items provided;

   b. Generating a claim record for billing based on the received clinical data, the claim record comprising one or more billed line items each with a code representing a service or product provided;

   c. Automatically validating the claim record by applying a set of payer-specific rules to the one or more line items, wherein the rules include required code combinations, service frequency limits, and field completion checks, and wherein any validation errors or warnings are recorded if the claim record fails to meet a payer's requirements;

   d. Executing a machine learning denial prediction on the claim record by analyzing the claim record with a trained model that uses historical claims and outcomes to predict a likelihood of denial, and generating at least one recommended corrective action if the predicted likelihood exceeds a threshold;

   e. Presenting, via a user interface, the validation errors or warnings and the at least one recommended corrective action to a user for review prior to claim submission, thereby enabling the user to adjust the claim record by providing missing information, adding documentation, or correcting codes;

   f. In response to user approval of the claim record, formatting the claim record into a standard electronic claim transaction format and transmitting the formatted claim to a claims clearinghouse or payer system for adjudication; and

   g. Upon receiving a response transaction from the payer system indicating a disposition of the claim, automatically updating the claim record's status in the platform, wherein if the response indicates a denial, the platform records the denial reason and notifies the user along with an automatically generated draft of an appeal or corrective action plan for the user to optionally pursue.

2. The method of claim 1, wherein automatically validating the claim record comprises checking the claim record against a library of at least 300 payer-specific edit rules for a plurality of insurance payers, the rules including at least: (i) frequency limits on billing specific codes within a defined time period, (ii) requirement that certain procedure codes have an associated diagnosis code indicating medical necessity, and (iii) detection of

missing companion codes that must be billed together .

3. The method of claim 1, wherein executing the machine learning denial prediction comprises: computing a feature set for the claim including patient demographics, billing codes, provider details, and any validation errors; inputting the feature set to a trained predictive model that outputs a probability of denial and an identification of one or more risk factors; and mapping the one or more risk factors to the recommended corrective action, such that the platform provides an explainable alert to the user (including a reason why the claim might be denied and guidance to address it) before the claim is submitted .

4. The method of claim 1, wherein the standardized format for receiving clinical data is an HL7 FHIR (Fast Healthcare Interoperability Resources) bundle, and wherein generating the claim record includes parsing the FHIR bundle to extract clinical events and translating the clinical events into billing line items with appropriate codes and units .

5. The method of claim 4, wherein the platform maintains a mapping between clinical events and billing codes such that if the FHIR bundle indicates a clinical service that corresponds to a billable code, the method automatically creates the corresponding line item, and further wherein the platform logs an audit record of the FHIR data ingestion and code generation for traceability.

6. The method of claim 1, further comprising, as part of automatically validating the claim record, reconciling temporary and permanent codes over a time-bound window, including identifying when a first code from the claim record representing a professional service (or temporary procedure) must be matched with a second code representing a related item or procedure within a predefined time period, and if the second code is absent in the claim record or related claims within the predefined time period, flagging the absence as a validation error or automatically inserting the second code into the claim record .

7. The method of claim 6, wherein the first code is a G-code for a home infusion nursing visit and the second code is a J-code for an infused drug, and the predefined time period is 30 days, such that the method ensures that for any home infusion visit billed, a corresponding drug administration is billed within 30 days, and vice versa, to comply with payer policy.

8. The method of claim 1, further comprising attaching an electronic document (selected from clinical notes, test results, or referral authorizations) to the claim record or a specific line item of the claim record in response to a user action or as prompted by the platform, and computing a cryptographic hash of the attached document's content and storing the hash in an immutable audit log entry associated with the claim record, thereby enabling subsequent verification of document integrity and provenance .

9. The method of claim 8, wherein the platform, upon claim submission, includes a reference or indicator of the attached document in the formatted claim or transmits the document via an electronic attachment interface to the payer, and records in the audit log the exact timestamp and hash of the document submitted, such that any later audit can confirm that the submitted documentation matches the original.

10. The method of claim 1, wherein formatting the claim record into the standard electronic claim transaction format comprises generating an X12 837 professional or institutional claim file populated with the claim data, performing compliance checks on the generated file, and encrypting or securing the file for transmission to the clearinghouse, and wherein receiving the response transaction comprises receiving an X12 835 electronic remittance advice or X12 277 claim status response and parsing said response to determine the outcome for each billed line item.

11. A healthcare claim management system comprising:

a. At least one processor and memory storing instructions that, when executed, implement a plurality of modules including a validation module, an AI analysis module, a reconciliation module, and an integration module;

b. The validation module configured to analyze draft insurance claims against stored payer-specific criteria and flag non-compliance issues in real time, wherein the payer-specific criteria are stored in a rules database that is configurable via an administrative interface;

c. The AI analysis module configured to assign a denial risk score to each claim or claim line by applying a machine learning model to claim data and to generate recommended actions to reduce the risk, the machine learning model being trained on historical claim outcomes;

d. The reconciliation module configured to cross-reference billing codes within and across claims for a given patient encounter or episode, and to enforce required code pairings or bundling rules by automatically detecting missing complementary codes or duplicate billings;

e. The integration module configured to receive clinical data from external systems in a first format and to output billing transactions in a second format, including a FHIR interface component to ingest clinical records from an EHR and an EDI component to produce X12 837 claim files and process 835/277 responses;

f. A user interface component operatively connected to the modules, the user interface component being configured to present claim editing screens, validation feedback, AI-driven suggestions, and worklists of claims requiring attention; and

g. An audit logging component that records each material event or change in the system in an immutable log with timestamps, including any data ingestion, rule validation result, user modification, document attachment (with hash as described in claim 8), submission, and payer response, thereby enabling complete traceability of the claim lifecycle.

12. The system of claim 11, wherein the reconciliation module comprises a code pairing engine specifically for managing episodic bundles, and wherein for at least one predefined pair of codes the system automatically links a first code to a second code within the same episode of care and prevents submission of a claim unless both codes or an allowed substitute are present, as per the predefined rules for that code pair.

13. The system of claim 11, wherein the user interface component is implemented as a web-based dashboard and also as an embeddable app within an EHR, and the integration module includes a SMART-on-FHIR adapter that allows the system's user interface to be launched from within a clinician's EHR session, populating claim data in the background via FHIR resources while the clinician or coder interacts with a familiar interface.

14. The system of claim 11, wherein the rules database for the validation module stores, for each payer or plan, a set of custom edits including required document attachments for specific codes, such that the system automatically prompts the user to attach a document (or automatically pulls available clinical documents) when those specific codes are present, and flags the claim if the attachment is missing.

15. The system of claim 11, wherein the AI analysis module comprises a plurality of models including a natural language processing model for analyzing textual clinical notes attached to a claim to identify supporting evidence of medical necessity, and wherein the system uses outputs of said model to advise the user if additional justification or documentation is likely needed for approval of the claim.

16. A non-transitory computer-readable medium storing program instructions that, when executed by one or more processors of a healthcare claim management server, cause the server to perform operations comprising: receiving and storing healthcare service data from one or more clinical information systems; generating a billing claim including line items with codes and charges derived from the healthcare service data; applying payer-specific validation rules to the billing claim and updating the claim with any detected errors or missing information indicators; evaluating the billing claim with a trained machine learning model to predict likelihood of claim denial and identify contributing factors; updating a user-accessible record of the claim with the predicted likelihood and an explanation of any contributing factors; responsive to user input addressing the errors or adding information, marking the claim as ready and transmitting the claim in an electronic standardized format to a payer network; and upon return of a response from the payer network, recording the outcome in the claim record and triggering an alert to the user if the claim was denied, the alert including an automatically

prepared set of next-step guidance for rectifying the denial.

17. The non-transitory computer-readable medium of claim 16, wherein the program instructions further cause the server to, in the event of a claim denial, automatically compile an appeal packet comprising the original claim data, all associated documentation from the claim record, and a draft appeal letter referencing the denial reason, thereby expediting the appeals process for the user .

18. The method of claim 1, wherein the platform is configured to support multiple deployment modes, such that in one mode the platform operates as a standalone claims processing system with its own database and user interface, and in another mode the platform operates as an overlay to an existing EHR or billing system by receiving data and returning results via APIs, and wherein the method further comprises selecting the deployment mode and enabling or disabling certain modules based on integration requirements of a particular healthcare provider.

19. The method of claim 1, wherein the step of automatically updating the claim record's status includes automatically posting payment details to the claim record when a paid 835 remittance is received, including allocation of amounts to individual line items and calculation of any write-off or patient responsibility, and generating a task for user review only if discrepancies or underpayments are detected.

20. The system of claim 11, further comprising a configuration interface that allows authorized users to input or modify the payer-specific rules and AI model thresholds without programming, wherein changes in configuration are versioned and audited, and the validation module and AI analysis module automatically incorporate updated rules or thresholds in subsequent claim processing.