TREQENE®

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Background

- Prior authorization (PA) plays a vital role in obtaining timely approvals for the provision of specific healthcare services to a patient covered by a health plan. The process is intended to manage the utilization of healthcare resources, reduce overuse or misuse of services, improve the quality of care, and control the overall spending on healthcare
- While PA is meant to ensure appropriate, cost-effective healthcare, it often creates barriers and administrative burdens for providers and causes care delays for patients^{1,2}
- According to 2022 physician survey by the American Medical Association (AMA), PA issues are associated with 94% of care delays and contribute to a negative impact on patient clinical outcomes and administrative inefficiencies. The same survey also demonstrated that an overwhelming 80% of physicians reported that PA requirements may lead to abandonment of treatment³

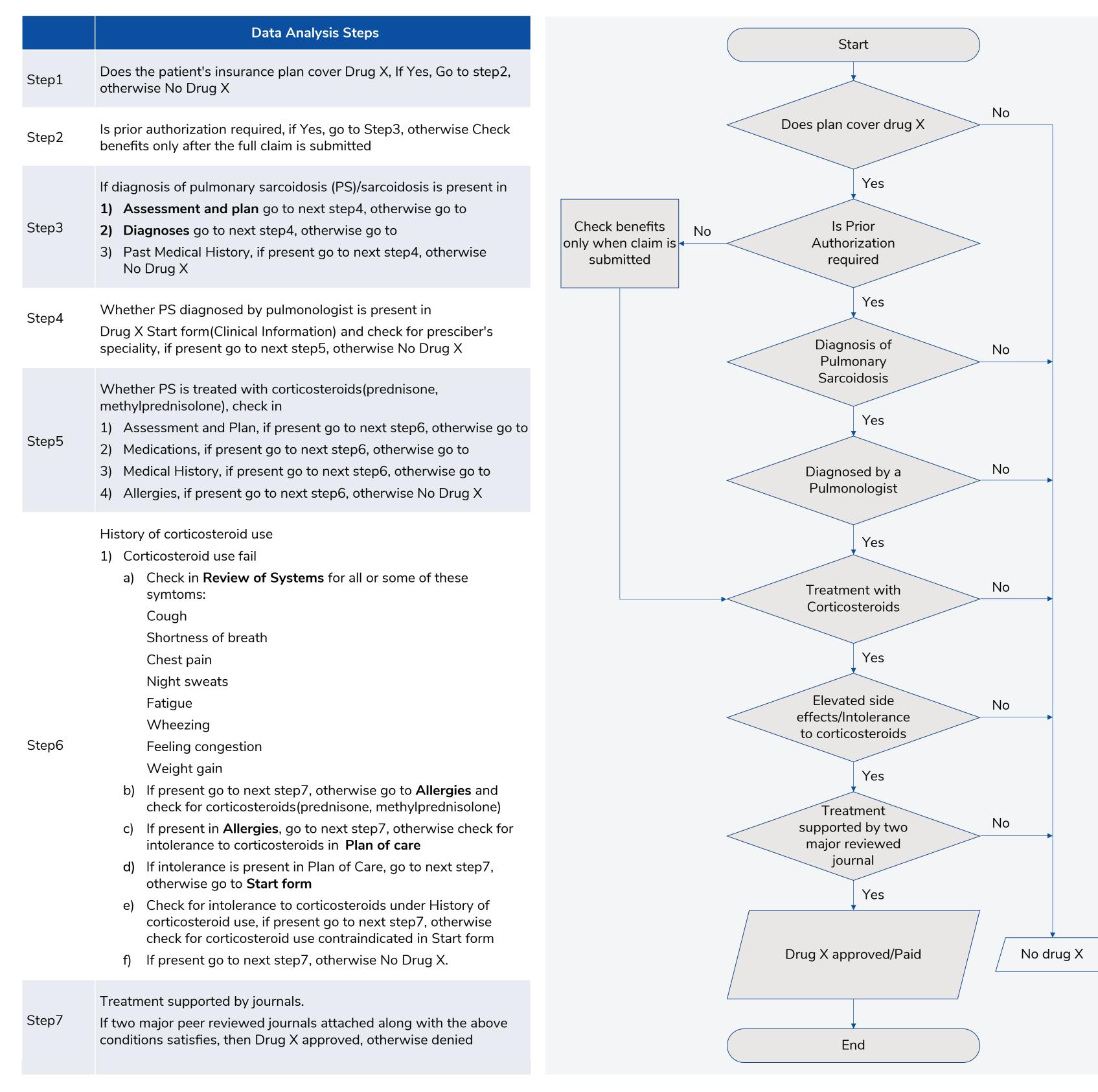
Objective

• The objective was to analyze PA data for a specialty product to help generate medical necessity insights along with provider and payer modelling insights that help with reducing drug abandonment and drive patient outcomes

Methodology (1/3)

- A retrospective case-by-case analysis of 5,000 patients' PA submissions for severe and critical autoimmune conditions in neurology, rheumatology, nephrology, pulmonology, and ophthalmology across various payers and providers was performed
- The deidentified PA case packets for each patient were provided by the sponsor's patient hub
- Each PA case packet consisted of the PA forms, start forms, letters of medical necessity, redacted medical records, lab results, and appeal requests that were submitted by the provider's office. The payer response letter to the PA applications for each case in the form of a response letter (approved, denied, withdrawn and closed, or pending) was also included in the PA case packet
- Artificial intelligence (AI) powered natural language processing (NLP) text extraction driven by clinical algorithms for each disease condition was used to transform the unstructured medical records and case forms into structured data
- The clinical algorithms were built using top-down and bottom-up approaches
 - The factors influencing the approval and denial of each case were assessed using a top-down approach, that included the diagnosis of the condition, treatment, disease progression, and payer guidelines that determined the need for the specialty product
 - In the bottom-up approach, the variables for each of the factors considered in the top-down approach were mapped from the medical records and PA forms (Fig 1 and 2)

Fig 1: Algorithm Used for AI/ML-Driven NLP Text Extraction (Top-Down Approach)



Driving Positive Patient Outcomes With Prior Authorization Analytics

Methodology (2/3) Fig 2: Algorithm Used for AI/ML-Driven NLP Text Extraction (Bottom-Up Approach) Document Level Attributes Logic Framework Patient Level Attributes A B C D E F G H I J K Case details Case details CASE ID: Ref. No Date Age Sex Race Ethinicty Marital status Blood type Facility name: Specializing In: (Parameter Documents Subsections Data points used • Where dd Sarcoldosis manifest? 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Document Subsections Data points used Detailed logic 1.Decision Notes 2.Denial 1.Diagnosis report 1.ICD codes 1.if drug is prescribed by the provider himself letter 3. Coverage Policy 2.Medications used 2.Diseases or with the consultation of neurologist & if 4. FDA approved 3.Diagnosis and medical 3.Medication Patient have diagnosed with infantile indications 5.FDA information 4. Clinical spasms(West Syndrome) & if the patient is approved dosing 6. Notes less than 2 vrs - Accepted Appeal Filling Form 5.Medical History 2. Otherwise - Denied Factor Diagnosis of infantile spasms (West Syndrome) Proventil HFA 108 90 BaseMCG/ACT Aerosol Soln, 2 (two) Inhalation 06/26/2017) Active. Symblcort 160-4.5MCG/ACT Aerosol, 2 (two) Puff Inhal 08/25/2017) Active. ClonazePAM 2MG Tablet, Oral Active. BuPROPion HCI ER (XL 300MG Tablet ER 24HR, Oral Active 1.Decision Notes 2.Denial 1.Prescriber's Speciality Provider's speciality 1.If drug is prescribed by the provider himself letter 3. 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Medical History the consultation of neurologist & if the 5.PDA approved dosing 5.Past Medical History patient have a history of failure or cannot MetFORMIN HCI. 1000MG Tablet, Oral13ID Active Case details Patient details Provider details Insurance details Allergies Medical History . **Key Operations: Key Operations: Key Operations:** • Structuring form information Patient level information Medical SME-curated situation-outcome mode Provides an NLP-supporting format • Granular level classification of medical • Presents different scenarios as testing rules information • Provides metadata for the for the NLP engine classification of form content • Feeds into the NLP engine as training data Fig 3: Algorithm Used for AI/ML-Driven NLP Text Extraction (Bottom-Up Approach)

Unstructured Medical Records and PA Forms Micardis 40 mg 1 table 03/14/2017 03/14/2017 Pennsaid 20 2 applications to affected and ng/gram/actuation 2 %) topical soln in netered-dose 09/02/2015 09/02/2015 Plaquenil 200 mg 2 tablets 10/06/2017 potassium chloride 1 packet 0 mEq oral packet rilosec 40 mg 1 capsule capsule,delayed Upper Extremity Inspection - Bilateral - No Cyanotic nailbeds, No Digital clubbing. Prinivil 10 mg 1 tablet Lower Extremity Inspection - Bilateral - No Cyanotic nailbeds. Palpation - Edema - Bilateral - No edema. Proventil HFA 90 2 puffs as needed 10/06/2017 ncg/actuation erosol inha <u>Neurologic</u> Neurologic evaluation reveals - alert and oriented x 3 with no impairment of recent or remote mem Mental Status - Normal. Cranial Nerves - Normal Bilaterally. Reglan 10 mg 10/06/2017 10/06/2017 Spiriva Respirat inhale 2 puff by inhalation .25 mcg/actuation route every day <u>Lymphatic</u> General Lymphatics Description - Normal , 000 8821 10/06/2017 01:30 PM 6/7 Assessment & Plan (Carmel Joseph, MD; 05/28/201804:44 PM) Sarcoid (135 | D86.9) Problem Story: PT PRESENTS IN OFFICE FOR FOLLOW-UP. IS C/O INCREASING SOB, WH COUGHING UP GREEN/YELLOW SPUTUM WEEKLY AS WELL AS A DRY COUGH. SYMPTOMS ARE 7 14:06 IPMG Lung Spec Harbour View (FAX)757 335 7568 P.019/038 solution for COMPLIANT WITH BREO QAM AND SYMBICORT QHS. IS USI REPORTS OF CHEST PAIN, TIGHTNESS, FEVER, CHILLS OR NIGH NG RESCUE INHALER/ NE inhalation 10/06/2017 Spiriva with 1 capsule Today's Impression: LEVAQUIN 750 MG QD X 7 DAYS HandiHaler 18 mcg DEPO 80 IM NOW and inhalation DIFLUCAN 100 MG QD X 7 DAYS CONTINUE BREO 200MCG, 1 PUFF QAM CONTINUE SYMBICORT 160/4.5 2 PUFFS Q PM capsules 10/06/2017 10/06/2017 Symbicort 160 inhale 2 puff by inhalation route 2 times every day in the mcg-4.5 mcg/actuation HFA morning and evening CONTINUE PROVENTIL PRN RESCUE aerosol inhaler CONTINUE ALB NEB TXS PRN Symblcort 80 10/06/2017 2 puffs mcg/actuation HFA CHEST X-RAY, PA AND LATERAL (71046) Routine (HILAR MASS IS NOTED BILATERALLY. aerosol inhaler CARDIOPULMONARY PROCESS) 10/06/2017 10/06/2017 Ventolin HFA 90 inhale 2 puff by inhalation RESPIRATORY FLOW VOLUME LOOP (94375) Routine (MILD OBSTRUCTION) mcg/actuation route every 4 - 6 hours as aerosol inhaler needed TOTAL BODY PLETHYSMOGRAPHY FOR LUNG VOLUME MEASUREMENT (94726) Routine Diagnostic Services Ordered/Completed This Visit DLCO (CARBON MONOXIDE DIFFUSING CAPACITY) (94729 Modifier Ordered Ordering Comments Status Test Schedule at Sentara Belle Harbor in 3 weeks - 1 w ordered CT CHEST W/O 10/06/2017 INJECTION, METHYLPREDNISOLONE ACETATE, 80 MG (J10 before follow up; HRCT chest - ILD protocol. DYE Restarted Diflucan 100MG, 1 (one) Tablet daily, #7, 7 days Restarted Levaquin 750MG, 1 (one) Tablet daily, #7, 7 day: MANAGER AND STILL THE PATIENT'S CONDITION HAS WORSENED. IF WE DO NOT GET THE PATIENT ON THE will be approved based on the following criteria: NEXT COURSE OF ACTION, WE RUN THE RISK OF THE sthma (493.90 | J45.909) PATIENT BEING ADMITTED TO THE HOSPITAL. BASED ON 1) Diagnosis of Pulmonary Sarcoidosis/Symptomatic sarcoidosis Problem Story: PT WITH WHEEZING, SOB AND A PRODUCT THE PATIENT'S HISTORY AND CURRENT CONDITION, ACTHAR HP GEL IS THE BEST CHOICE FOR THIS PATIENT / 2) Prescribed by or in consultation with Pulmonologist THIS TIME. PLEASE SEE ATTACHED CHART NOTES FOR INTINUE SYMBICORT 160/4.5 2 PUFFS O P CONTINUE PROVENTIL PRN RESCUE CONTINUE ALB NEB TXS PRN Brachythecapy SUPPORTING DOCUMENTATION. ANY QUESTIONS PLEASE CONTACT ME. Thoracentesis Current Plans: Plearodesis Notice: Please be sure to complete this form in its entiroty. Missing information makes difficult to approve requests and creates a longer processing time. ine: Lung Cancer SINCERELY, Critical Care Medicine Allergy Testing Allergy Consultation FOLMONOLOGIST Immunology Pediatric Allergy Strength & Dove 80 Wild & Quartery prescribed per monte: 7 JOOME KOOTO DSCO.O. Route of administration: Sub-calenceus Infused via inplanted pump Where will this medication be obtained? Proportient's office stock Home Heatty / Home Infusion vendor (neme): Ambulatory Infusion Center Hospital - In patient Hospital - Cut patient

AI-Driven NLP Text Extraction

Structured Data Were visit Was a letter Whether the Was the Name of the Is the patient Name of the Is it a chronic Duration of Has the steroids in failure DMARDs/bio the past? (specific to ogics? drug (Format: Drug (Format: Drug name - Dose) name - Dose) Intolerant to Unknown ot rashes on Yes Had been Yes ontinued to Yes No response Yes Coverage is lot a medical Ye overage is Medrol - 4mg Yes Unknown Prednisone Medrol -4mg unknown unknown No Coverage for Yes Unknown yes unknown Yes Difficult to Unknown HP Drug X Gel Yes Unknown Coverage is Ineffective, Prednisone navailable | Side effects Not a medical Yes Not a medical Yes Drug X gel is Y Coverage is Yes Intolerant to ACE/ARB Due to Coverage is Drug X gel is Patient Cellcept, Lasix No response Unavailabla Unavailabla Unavailabla Prednisone- Yes over 1 year Yes The Clinical Yes Medication No Medication No Unavailable Unavailable N/A Unavailable Unavailable Yes Unavailable Unavailable N/A 61868

Methodology (3/3)

- comorbidities, treatment history, and dosing, were reviewed
- The safety and effectiveness of the early-line therapies were assessed to determine the comorbidities and their relationship to the therapies and the refractory or progressive status of the given condition
- and approved claims
- research data

Results

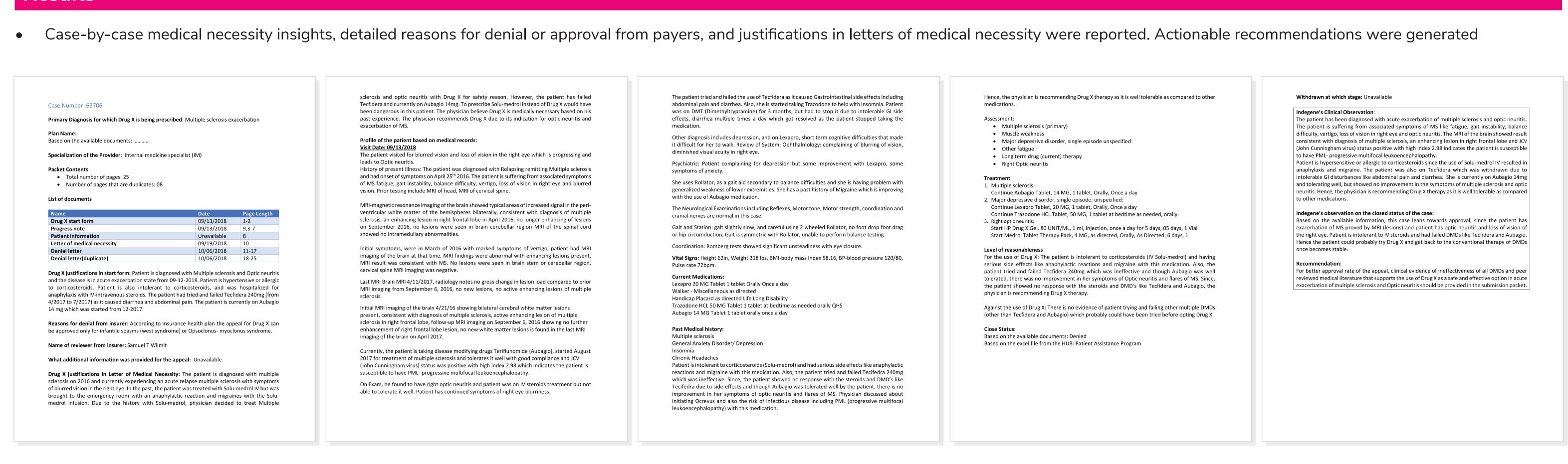


Table 1: Healthcare Resource Utilization and Costs for Approved and Denied Cases

Approved Cases	Denied Cases
6.50%	9.30%
4.70%	9.40%
\$14,037	\$22,974
\$716	\$813
\$11,697	\$19,968
	4.70% \$14,037 \$716

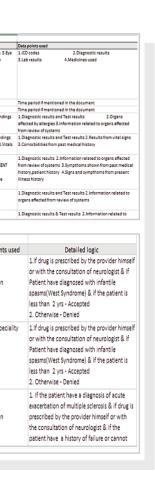
• Around 6.5% of patients with approved cases had biologic disease-modifying antirheumatic drugs usage, compared to 9.3% of those with denied cases

Patients with approved cases incurred \$14,037 in mean total annual medical costs compared to \$22,974 for those with denied cases

- The medical necessity and payer modeling insights and case-by-case actionable recommendations helped a leading US-based pharmaceutical enterprise achieve a 32% higher PA approval rate than the rate prior to applying PA analytics
- A reduction in unwarranted rejections of clinically valid PA submissions may decrease healthcare utilization and costs
- The NLP-driven clinical analytic insights enabled an improvement in PA approval rates, thus ensuring faster and greater patient access to drugs

1. 2022 AMA prior authorization (PA) physician survey. (American Medical Association, 2022) https://www.ama-assn.org/system/files/prior-authorization-survey.pdf

- Automation of the Prior Authorization Process. CAQH. CAQH-CORE-Automating-Prior-Authorization.pdf
- 3. Prior Auth Comprehensive Report. https://www.ehidc.org/sites/default/files/resources/files/Prior%20Auth%20Comprehensive%20Report%20Feb%202019.pdf



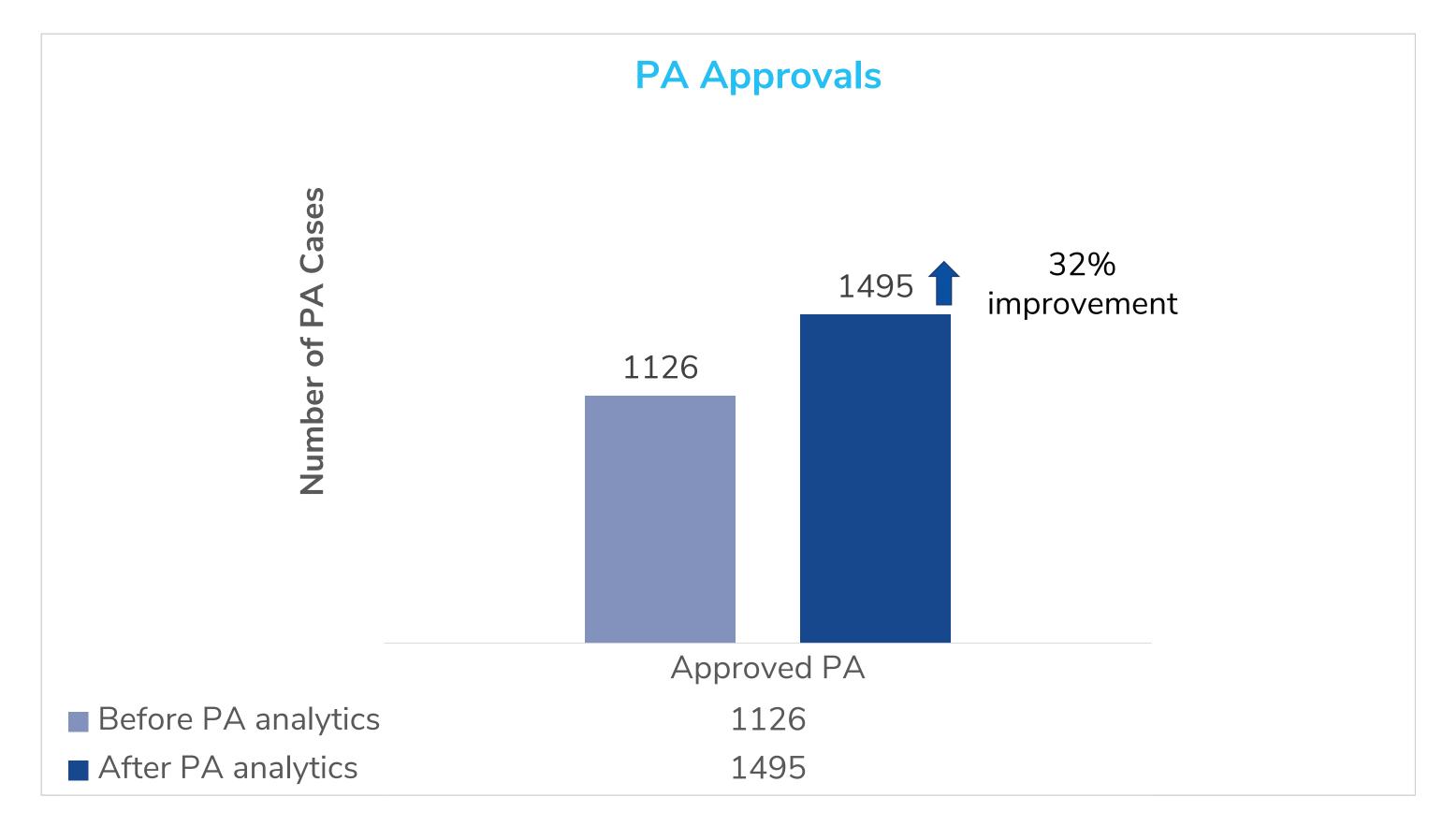


• A qualitative analysis of the machine-generated structured data was conducted by medical experts. Each patient's clinical information, including signs and symptoms of disease progression, laboratory results,

• A quantitative analysis of the structured data was performed to classify variables and map cause-and-effect for the approval and (or) rejection of each case to model payer behavior through the number of denied

• The healthcare resource utilization for each patient across the approved and denied cases were assessed. The cost of healthcare resource utilization for each disease condition was mapped from the secondary

Fig 4: PA Approvals Before and After PA Analytics



• We observed a 32% improvement in PA approval as a result of PA analytics



Poster presented at ISPOR 2023,



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