

AI-Powered Medical Blog System Pipeline

www.skrzypecki.pl

EXECUTIVE SUMMARY

This document outlines the complete pipeline structure for implementing a dual AI-powered blog system with patient and medical professional sections, including registration, content generation, tracking, and GDPR compliance.

SYSTEM OVERVIEW

Two Blog Types:

1. **Public Patient Blog** - Published to **okulistykaakademicka.pl** (no registration required)
2. **Professional Medical Blog** - Published to **www.skrzypecki.pl** (registration with professional verification required)

Key Architecture:

- **okulistykaakademicka.pl** - Patient-facing content, accessible to everyone
- **www.skrzypecki.pl** - Professional portal with login for doctors/optometrists only
- **Newsletter system** - For registered professionals on skrzypecki.pl

Design Requirements:

- Similar aesthetic to OpenAI blog (clean, modern, minimalist)

- Complements existing design of both websites
 - Responsive and accessible
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PIPELINE 1: CONTENT GENERATION PIPELINE

Step 1: Content Input

Responsible: Admin/Content Manager

- Admin uploads PDF(s) to content management system
- PDFs include: research papers, clinical guidelines, medical studies, treatment protocols
- System extracts text, images, tables, and metadata
- Files stored securely in cloud storage (AWS S3/Azure Blob)
- File validation: format check, virus scan, size limits

Step 2: AI Processing - Dual Track Generation

Technology: Claude API (Anthropic)

Track A: Patient Blog Content

- **Prompt Engineering:** "Create patient-friendly content from this medical document"
- **Content Style:** Simple language, analogies, avoid jargon
- **Output:**
 - Article title (SEO optimized)
 - Meta description
 - Introduction paragraph
 - Main body (800-1500 words)

- Key takeaways section
- Related questions/FAQ
- Image suggestions with descriptions

Track B: Professional Blog Content

- **Prompt Engineering:** "Create detailed clinical content for healthcare professionals"
- **Content Style:** Technical, evidence-based, includes citations
- **Output:**
 - Article title with medical terminology
 - Meta description
 - Clinical summary
 - Detailed analysis (1500-3000 words)
 - Evidence level/study quality assessment
 - Clinical implications
 - References and citations
 - Image suggestions with medical terminology

Step 3: SEO Optimization

Automated Process:

- Keyword extraction and density optimization
- Meta tags generation (title, description, keywords)
- Header structure optimization (H1, H2, H3)
- Internal linking suggestions
- Alt text for images

- Schema markup generation (Medical/Article schema)
- URL slug generation
- Readability score check

Step 4: Image Generation/Selection

Two Options:

Option A - AI Image Generation:

- Use DALL-E or Midjourney API
- Generate medical illustrations based on content
- Ensure images are appropriate for medical context

Option B - Stock Image Selection:

- Query medical stock photo databases
- Select relevant images based on article keywords
- Ensure proper licensing

Image Processing:

- Resize for web optimization
- Generate multiple sizes (thumbnail, medium, large)
- WebP format conversion
- Add watermark if needed
- Alt text generation for accessibility

Step 5: Content Review & Approval

Human-in-the-Loop:

- Admin reviews AI-generated content
- Medical professional reviews for accuracy (recommended)
- Edit and refine as needed
- Approve for publication or send back for regeneration

Step 6: Publication

Automated Process:

For Patient Blog (okulistykaakademicka.pl):

- Content saved to database
- Published to okulistykaakademicka.pl blog section
- Generate sitemap entry for okulistykaakademicka.pl
- Submit to search engines
- Public RSS feed update

For Professional Blog (skrzypecki.pl):

- Content saved to database
 - Published to skrzypecki.pl professional section (login-protected)
 - Generate sitemap entry for skrzypecki.pl
 - Newsletter notification to registered professionals
 - Archive original PDF with reference link
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PIPELINE 2: USER REGISTRATION & AUTHENTICATION

Step 1: User Chooses Path

Entry Point: skrypecki.pl homepage

- **Patient Content:** Automatically published to okulistykaakademicka.pl (no login needed, public access)
- **Professional Access:** Login portal on skrypecki.pl for doctors/optometrists

Note: All registration and authentication happens exclusively on skrypecki.pl

Step 2: Professional Registration Form

Required Fields:

Personal Information:

- Full name (First, Last)
- Email address
- Phone number
- Country/Region

Professional Information:

- Professional type dropdown:
 - Lekarz Okulista (Ophthalmologist)
 - Optometrysta (Optometrist)
 - Other Eye Care Professional
- Professional Registration Number (e.g., PWZ number in Poland)
- Specialty/Field (e.g., Retina, Glaucoma, Pediatric Ophthalmology)

- Institution/Hospital name
- Years of practice

Newsletter Preferences:

- Subscribe to professional newsletter (checkbox)
- Newsletter frequency preference:
 - Weekly digest
 - Bi-weekly digest
 - Monthly digest
 - Immediate notifications for new content

Account Security:

- Password (with strength requirements)
- Password confirmation
- Two-factor authentication option

Legal Compliance:

- GDPR consent checkbox (required)
- Terms of Service acceptance (required)
- Marketing communications opt-in (optional)
- Cookie policy acceptance (required)

Step 3: Professional Verification

Automated Verification:

- Check registration number against medical registry API

- Validate format and checksum
- Cross-reference with professional databases

Manual Verification (if automated fails):

- Admin reviews application
- Request additional documentation (license scan)
- Verify credentials manually
- Approve or reject within 24-48 hours

Verification Status:

- Pending: Account created but not verified
- Verified: Full access granted
- Rejected: Access denied with reason

Step 4: Account Activation

Upon Verification:

- Send welcome email with login credentials
- Provide access to professional blog section on skrzypecki.pl
- Subscribe to newsletter (if opted in during registration)
- Send first newsletter with onboarding content
- Enable tracking for their activity
- Assign unique user ID for analytics

Step 5: Login System

Authentication:

- Email/password login
- "Remember me" option
- Password reset via email
- Session management (30-day expiry)
- Optional 2FA via SMS or authenticator app

Security Features:

- Rate limiting (prevent brute force)
 - Account lockout after failed attempts
 - IP logging for suspicious activity
 - Secure password hashing (bcrypt/Argon2)
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PIPELINE 3: NEWSLETTER SYSTEM (PROFESSIONAL BLOG)

Newsletter Purpose

The newsletter keeps registered ophthalmologists and optometrists on skrzypecki.pl informed about new professional content, research updates, and relevant ophthalmology developments.

Newsletter Types

1. New Content Digest

- Triggered when new articles are published
- Frequency based on user preference (weekly/bi-weekly/monthly)

- Includes article summaries and direct links

2. Immediate Notifications

- For breaking research or critical updates
- Opt-in only (user selects during registration)
- Sent within hours of content publication

3. Monthly Highlights

- Curated selection of best content from the month
- Most-read articles
- Trending topics in ophthalmology
- Upcoming events or webinars

Newsletter Content Structure

Email Header:

- Skrzypecki.pl branding
- Date and issue number
- Personalized greeting: "Witaj [First Name],"

Main Content Sections:

Featured Article:

- Hero image
- Article title
- 2-3 sentence summary

- "Read More" button linking to skrzypecki.pl (login-protected)
- Estimated reading time

Recent Articles (3-5 articles):

- Thumbnail image
- Article title
- Short excerpt (1 sentence)
- Publication date
- Category/specialty tags
- Link to full article

Research Highlights:

- Brief summaries of key research findings
- Links to source PDF documents
- Clinical relevance notes

Quick Stats:

- Number of new articles this period
- Most popular article
- Most discussed topic

Footer:

- Unsubscribe link (GDPR required)
- Manage preferences link
- Privacy policy link

- Contact information
- Social media links (if applicable)

Newsletter Pipeline

Step 1: Content Collection

- System monitors new article publications
- Collects articles based on newsletter schedule
- Prioritizes content by category and engagement

Step 2: AI-Powered Newsletter Generation Technology: Claude API

- Generate engaging subject lines
- Create article summaries optimized for email
- Personalize content based on user specialty (if available)
- A/B test subject lines for better open rates

Step 3: Newsletter Assembly

- Use responsive email template
- Insert personalized user data
- Add dynamic content blocks
- Generate unique tracking links for each recipient
- Preview generation for testing

Step 4: Scheduling & Delivery Technology: SendGrid, Mailchimp, or AWS SES

Scheduling Rules:

- Weekly digest: Send every Monday at 8:00 AM (Warsaw time)

- Bi-weekly digest: Send every other Monday at 8:00 AM
- Monthly digest: Send first Monday of month at 8:00 AM
- Immediate: Send within 2 hours of content publication

Delivery Process:

- Segment recipients by preference
- Queue emails for batch sending
- Implement sending rate limits (avoid spam filters)
- Retry failed deliveries (max 3 attempts)

Step 5: Tracking & Analytics

Email Metrics:

- Delivery rate
- Open rate (target: >25%)
- Click-through rate (target: >5%)
- Bounce rate (target: <2%)
- Unsubscribe rate (target: <0.5%)

Content Performance:

- Which articles get most clicks
- Time of day with best engagement
- Device type (mobile vs desktop)
- Geographic location of readers

User Engagement:

- Track individual user opens/clicks
- Identify most engaged subscribers
- Identify inactive subscribers (no opens in 6 months)

Newsletter Management Features

For Registered Users (Self-Service):

Preference Management Page:

- Change newsletter frequency
- Select content categories of interest
- Update email address
- Pause newsletter temporarily (vacation mode)
- Unsubscribe completely

Newsletter Archive:

- Access past newsletters online
- Browse by date or topic
- Search newsletter content

For Administrators:

Newsletter Dashboard:

- Create/edit newsletter campaigns
- Preview before sending
- Schedule or send immediately
- View sent newsletter history

- Analytics and reporting

Subscriber Management:

- View all subscribers
- Segment by specialty, location, engagement
- Manual subscription management
- Bulk actions (pause, reactivate, remove)
- Export subscriber list

Template Management:

- Create/edit email templates
- A/B test different designs
- Responsive design preview
- Brand consistency checks

Re-engagement Campaigns

For Inactive Users:

- Identify users who haven't opened in 3+ months
- Send special "We Miss You" campaign
- Offer preference update option
- Final reminder before auto-unsubscribe (6 months)

Welcome Series:

- Day 1: Welcome email with platform overview
- Day 3: Highlight popular content

- Day 7: Introduce newsletter and resources
- Day 14: Ask for feedback/preferences

GDPR Compliance for Newsletter

Required Elements:

- Clear opt-in during registration (no pre-checked boxes)
- Explicit consent for marketing emails
- Easy unsubscribe in every email (one-click)
- Unsubscribe confirmation within 48 hours
- Data retention: Remove unsubscribed users from list
- Privacy policy link in every email
- Clear explanation of data usage

Consent Management:

- Log when user subscribes (timestamp, IP)
- Log when user changes preferences
- Log when user unsubscribes
- Maintain audit trail for compliance

Newsletter Automation Rules

Auto-subscribe:

- New verified users (if they checked the box)
- Default to weekly digest

Auto-unsubscribe:

- Bounced emails (after 3 hard bounces)
- Spam complaints
- User requests
- Account deletion

Auto-pause:

- Too many unopened emails (10+ consecutive)
- Send re-engagement email first

Technical Implementation

Email Service Provider Options:

- **SendGrid** (recommended for transactional + marketing)
- **Mailchimp** (user-friendly, good analytics)
- **AWS SES** (cost-effective, requires more setup)
- **Mailgun** (developer-friendly)

Email Template Framework:

- MJML (responsive email framework)
- HTML/CSS with inline styles
- Mobile-first design
- Dark mode support

Integration Points:

- User database (subscriber list sync)

- Content management system (new articles)
- Analytics system (track engagement)
- GDPR compliance system (consent management)

Newsletter Content Calendar

Weekly Cycle:

- Monday: Newsletter sent
- Tuesday-Thursday: Monitor engagement
- Friday: Analyze performance
- Weekend: Prepare next week's content

Monthly Tasks:

- Review overall newsletter performance
- Update email templates if needed
- Clean subscriber list (remove bounces)
- Plan special campaigns

Quarterly Tasks:

- Major analytics review
- Survey subscribers for feedback
- A/B test new formats
- Update content strategy

Success Metrics

Growth Metrics:

- New subscribers per month (target: based on new registrations)
- Subscriber retention rate (target: >95%)
- List growth rate

Engagement Metrics:

- Average open rate (target: >25%)
- Average click rate (target: >5%)
- Articles clicked per newsletter (target: 2+)
- Forward/share rate

Content Performance:

- Most popular article categories
- Best performing subject lines
- Optimal send times
- Device preferences (optimize for mobile if >60%)

Business Impact:

- Newsletter-driven traffic to skrypecki.pl
 - Increased professional blog engagement
 - User retention improvement
 - Professional community growth
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PIPELINE 4: TRACKING & ANALYTICS

User Tracking (Professional Blog)

Data Collected:

Account Activity:

- Login frequency and timestamps
- Session duration
- Last login date
- Active/inactive status

Content Engagement:

- Articles viewed (with timestamps)
- Time spent on each article
- Scroll depth
- Downloads (if PDFs available)
- Bookmarks/saves
- Comments posted
- Shares (if enabled)

Search Behavior:

- Search queries within blog
- Filter preferences
- Category interests

Device & Technical:

- Device type (desktop/mobile/tablet)
- Browser type
- Operating system
- Screen resolution
- Geographic location (city/country)

Analytics Dashboard

For Administrators:

User Metrics:

- Total registered professionals
- Active users (daily/weekly/monthly)
- New registrations over time
- User retention rate
- Professional type breakdown

Content Metrics:

- Most viewed articles
- Average time on page
- Bounce rate
- Popular topics/categories
- Search trends
- Download statistics

Engagement Metrics:

- Comments per article
- User interaction rate
- Return visitor percentage
- Referral sources

Technology Stack for Tracking:

- **Google Analytics 4** (with GDPR compliance)
 - **Custom database logging** (for detailed user behavior)
 - **Heatmap tools** (Hotjar/Microsoft Clarity)
 - **Event tracking** (custom JavaScript events)
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PIPELINE 4: GDPR COMPLIANCE

Data Collection & Consent

Cookie Consent Banner:

- Display on first visit
- Categorize cookies:
 - Strictly Necessary (always on)
 - Functional
 - Analytics
 - Marketing
- Allow granular consent choices
- Easy to withdraw consent

- Store consent preferences

Privacy Policy:

- Clear explanation of data collection
- Purpose of data processing
- Legal basis for processing
- Data retention periods
- Third-party data sharing
- User rights explanation
- Contact information for DPO (Data Protection Officer)

Data Processing Agreement:

- Document all third-party processors (Claude API, hosting, analytics)
- Ensure processors are GDPR compliant
- Maintain processor agreements

User Rights Implementation

Right to Access:

- User dashboard showing all their data
- Export function (download personal data as JSON/CSV)
- Clear data display (profile, activity, preferences)

Right to Rectification:

- Allow users to edit profile information
- Update preferences anytime

- Correct inaccurate data

Right to Erasure ("Right to be Forgotten"):

- "Delete Account" button in settings
- Anonymize user data in analytics (cannot delete analytics)
- Remove personal information from database
- Maintain audit log of deletion requests
- 30-day grace period before permanent deletion

Right to Data Portability:

- Export all user data in machine-readable format (JSON)
- Include: profile, activity logs, preferences, content history

Right to Object:

- Opt-out of marketing emails (unsubscribe link)
- Opt-out of analytics tracking
- Opt-out of profiling

Right to Restrict Processing:

- Pause account (disable tracking without deletion)
- Limit data collection temporarily

Data Security Measures

Technical Safeguards:

- SSL/TLS encryption (HTTPS)

- Database encryption at rest
- Secure password hashing
- Regular security audits
- Firewall and DDoS protection
- Regular backups with encryption

Organizational Measures:

- Access controls (role-based permissions)
- Employee training on data protection
- Data breach response plan
- Regular compliance audits
- Vendor management (ensure processors are compliant)

Data Retention Policy

Registration Data:

- Keep while account is active
- Delete 30 days after account deletion request
- Keep audit logs for 2 years (legal requirement)

Analytics Data:

- Anonymize after 14 months (Google Analytics standard)
- Aggregate historical data (no personal identifiers)

Content Interaction Data:

- Keep while account is active

- Anonymize on account deletion

Legal Documents:

- Keep consent records for 3 years after account closure
- Maintain privacy policy version history

GDPR Compliance Checklist:

- Privacy policy published and accessible
 - Cookie consent banner implemented
 - User rights request system (access, delete, export)
 - Data Processing Agreements with all vendors
 - Data breach notification procedure (72 hours)
 - Data Protection Impact Assessment (DPIA) completed
 - Regular compliance audits scheduled
 - User consent logging system
 - Data encryption implemented
 - Vendor compliance verified
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TECHNICAL ARCHITECTURE

Frontend

- **Framework:** React.js or Next.js
- **Styling:** Tailwind CSS (for OpenAI-like design)
- **State Management:** React Context or Redux
- **Forms:** React Hook Form with validation

Backend

- **API:** Node.js with Express or Python Django/FastAPI
- **Authentication:** JWT tokens + refresh tokens
- **Database:** PostgreSQL (relational data)
- **File Storage:** AWS S3 or Azure Blob Storage
- **Cache:** Redis (for session management)

AI Integration

- **Primary:** Claude API (Anthropic) for content generation
- **Image:** DALL-E API or stock photo APIs
- **PDF Processing:** pdf-parse (Node.js) or PyPDF2 (Python)

Hosting & Infrastructure

- **Hosting:** AWS, Azure, or Google Cloud
- **CDN:** CloudFlare (for static assets and security)
- **Email:** SendGrid or AWS SES
- **Monitoring:** Sentry (error tracking), Datadog (performance)

Security

- **SSL Certificate:** Let's Encrypt or CloudFlare
 - **WAF:** Web Application Firewall
 - **Rate Limiting:** Express-rate-limit or nginx
 - **DDoS Protection:** CloudFlare
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DATABASE SCHEMA OVERVIEW

Users Table

- user_id (primary key)
- email
- password_hash
- full_name
- phone
- professional_type
- registration_number
- specialty
- institution
- verification_status
- created_at
- last_login
- gdpr_consent
- marketing_consent

Blog Posts Table

- post_id (primary key)
- title
- slug
- content
- meta_description

- keywords
- blog_type (patient/professional)
- author_id
- status (draft/published)
- published_at
- view_count
- source_pdf_url

User Activity Table

- activity_id (primary key)
- user_id (foreign key)
- post_id (foreign key)
- action_type (view/download/share)
- timestamp
- session_id
- device_info

Consent Log Table

- consent_id (primary key)
- user_id (foreign key)
- consent_type
- consent_given
- timestamp
- ip_address

DEVELOPMENT PHASES

Phase 1: Foundation (Weeks 1-2)

- Design mockups and wireframes
- Database schema design
- Set up development environment
- Basic frontend structure
- User authentication system

Phase 2: Core Features (Weeks 3-5)

- Registration and verification system
- Admin content upload interface
- AI content generation pipeline (basic)
- Blog display pages (both types)
- User dashboard

Phase 3: Advanced Features (Weeks 6-7)

- SEO optimization automation
- Image generation/selection system
- Advanced tracking and analytics
- Search functionality
- Comments system (if needed)

Phase 4: Compliance & Security (Week 8)

- GDPR compliance implementation
- Cookie consent system
- Privacy policy and legal pages
- Security hardening
- Penetration testing

Phase 5: Testing & Launch (Weeks 9-10)

- User acceptance testing
 - Performance optimization
 - Bug fixes
 - Content migration
 - Soft launch
 - Full launch
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BUDGET CONSIDERATIONS

Development Costs:

- Frontend Developer: 200-400 hours
- Backend Developer: 200-400 hours
- UI/UX Designer: 40-80 hours
- DevOps Engineer: 40-80 hours

Third-Party Services (Monthly):

- Claude API: \$500-2000 (depending on usage)
- Hosting: \$100-500
- Email service: \$20-100
- Analytics tools: \$0-200
- Image generation: \$50-200
- SSL/Security: \$50-200

One-Time Costs:

- Legal consultation (GDPR): \$2000-5000
 - Penetration testing: \$1000-3000
 - Design assets: \$500-2000
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SUCCESS METRICS

For Patient Blog:

- Monthly unique visitors
- Average time on page (target: 3+ minutes)
- Bounce rate (target: <60%)
- Organic search traffic growth
- Social shares

For Professional Blog:

- Registered professionals (target: set based on specialty)
- Active users (monthly return rate target: >40%)
- Content engagement rate
- Average articles read per session
- Time spent per visit

For AI Content:

- Content generation success rate (target: >95%)
 - Admin approval rate (target: >80% first-pass)
 - SEO performance (keyword rankings)
 - Content freshness (posts per week)
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MAINTENANCE & UPDATES

Regular Maintenance:

- Weekly: Content moderation, user verification checks
- Monthly: Analytics review, SEO performance audit
- Quarterly: Security updates, compliance audit
- Annually: GDPR compliance review, legal policy updates

Continuous Improvement:

- A/B testing for content formats

- User feedback collection
 - AI prompt optimization
 - Performance monitoring and optimization
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CONTACT & SUPPORT

For Technical Issues:

- Technical support email
- Response time: 24-48 hours

For Professional Verification:

- Verification support email
- Response time: 24-48 hours

For GDPR Requests:

- Data protection officer email
 - Response time: 30 days (legal requirement)
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APPENDICES

Appendix A: Sample AI Prompts

[Include example prompts for patient and professional content generation]

Appendix B: GDPR Compliance Checklist

[Detailed compliance checklist with checkboxes]

Appendix C: API Integration Documentation

[Technical specs for Claude API integration]

Appendix D: Database ER Diagram

[Visual representation of database relationships]

Appendix E: User Flow Diagrams

[Visual flowcharts for registration, content generation, etc.]

Document Version: 1.0

Last Updated: January 23, 2026

Prepared For: www.skrzypecki.pl Medical Blog System

Prepared By: AI Systems Architecture Team