📄 **ONC §170.315(d)(13)**

Multi-Factor Authentication (MFA) – Evidence Package

Product: **Pace + / Content Distributor**
Version: 4.1.0

1️⃣ Criterion Summary

Regulatory Requirement:
The Health IT must support multi-factor authentication for user access control.

System must:

- Require at least two authentication factors
- Enforce MFA when enabled
- Prevent bypass
- Protect against brute-force OTP attacks
- Log authentication events

2️⃣ MFA Use Case Statement

Multi-Factor Authentication (MFA) is required for all user access to protected functionality within the Pace Plus system. MFA is enforced immediately after successful username and password validation and prior to granting access to any system resources.

MFA is required in the following scenarios:

- All user login attempts to the application
- Access to protected clinical and administrative data
- Execution of sensitive operations, including data export, user management, and system configuration
- Any session where MFA is enabled at the user or system level

The authentication process requires two factors:

1. Knowledge Factor – Username and password
2. Possession Factor – Time-based One-Time Password (TOTP) generated via an authenticator application

Users are not granted access until both factors are successfully validated. The system prevents bypass by restricting access to all protected resources until MFA verification is complete.

To ensure security, the system enforces:

- Limited OTP attempts with temporary lockout on repeated failures
- Protection against brute-force attacks
- Logging of all MFA-related events for audit and compliance

3️⃣ Enrollment Process (New Users)

When user logs in and no MFA row exists:

- Row inserted in tblUserMfaSettings
- Unique Base32 secret generated (32 chars)
- QR code generated locally
- Manual key shown only during enrollment
- MFA enabled after first successful OTP verification

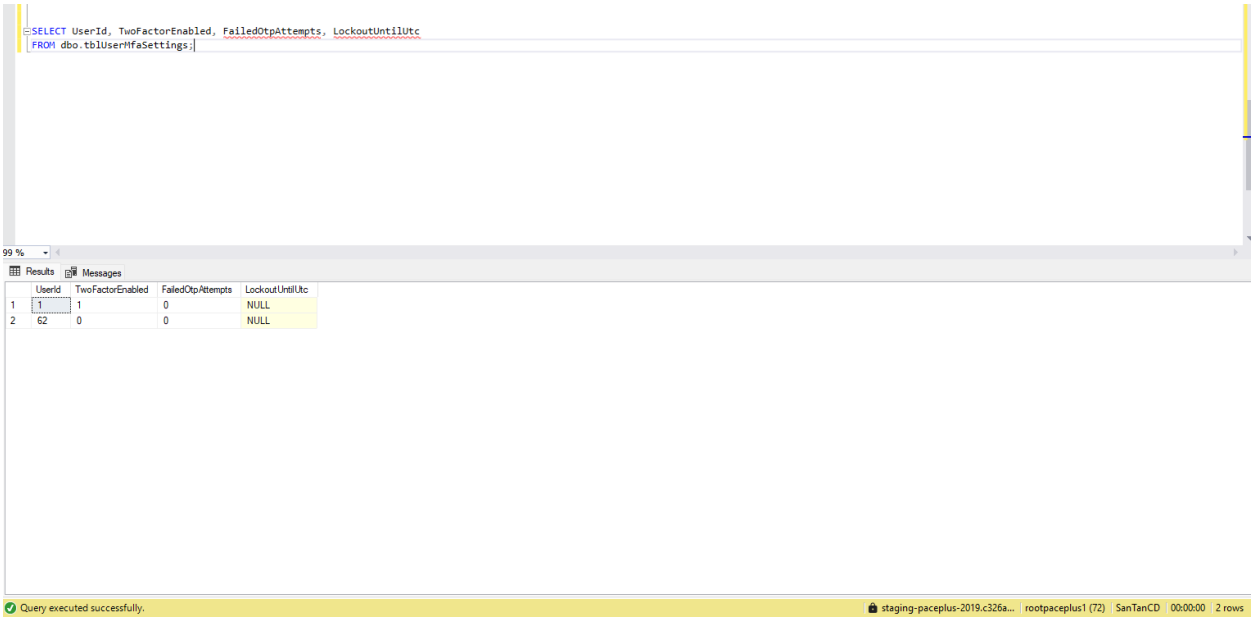
4️⃣ Database Evidence

Table: tblUserMfaSettings

Columns:

Column	Purpose
UserId	FK to user
TwoFactorEnabled	MFA status

Column	Purpose
TotpSecret	Unique per-user secret
FailedOtpAttempts	Attempt counter
LockoutUntilUtc	Lockout timestamp
UpdatedUtc	Audit timestamp



5️⃣ Brute-Force Protection

Controls Implemented

- Max OTP attempts: 5
- Lockout duration: 15 minutes
- Lockout enforced before validation
- Attempts reset on successful login

6️⃣ Audit Logging

Table: tblAuthAuditLog

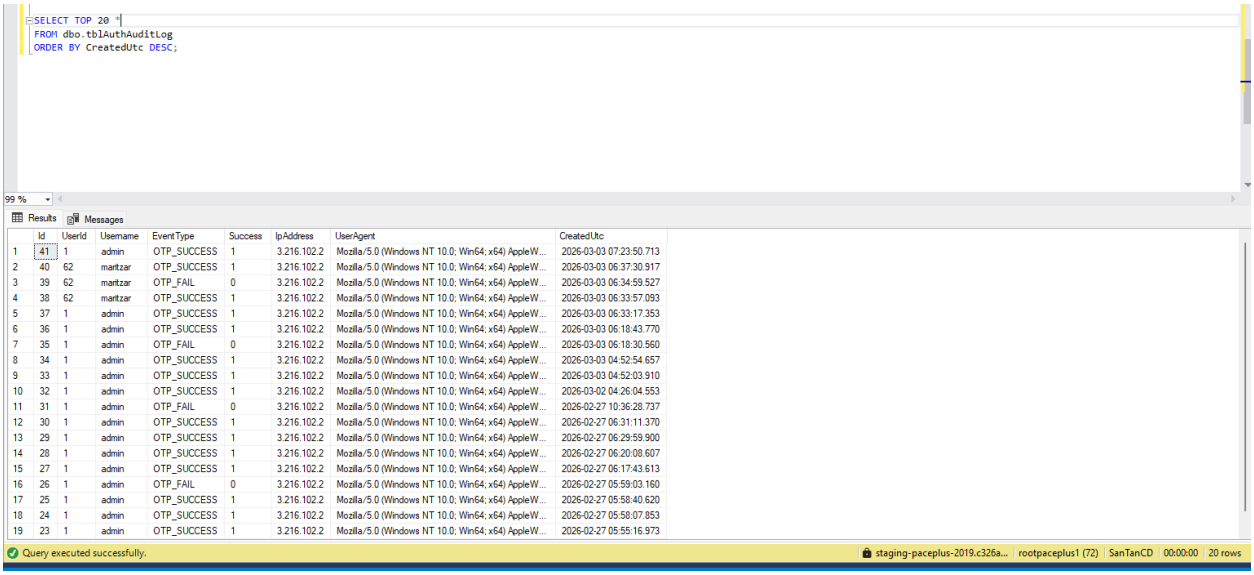
Logged Events:

- OTP_SUCCESS
- OTP_FAIL
- OTP_LOCKED

Each log includes:

- UserId
- Username
- IP Address
- UserAgent
- Timestamp (UTC)
- Success flag

Proof Query



```
SELECT TOP 20 *
FROM dbo.tblAuthAuditLog
ORDER BY CreatedUtc DESC;
```

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Results | Messages

	Id	UserId	Username	EventType	Success	IpAddress	UserAgent	CreatedUtc
1	41	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-03-03 07:23:50.713
2	40	62	maritzar	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-03-03 06:37:30.917
3	39	62	maritzar	OTP_FAIL	0	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-03-03 06:34:59.527
4	38	62	maritzar	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-03-03 06:33:57.093
5	37	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-03-03 06:33:17.353
6	36	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-03-03 06:18:43.770
7	35	1	admin	OTP_FAIL	0	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-03-03 06:18:30.560
8	34	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-03-03 04:52:54.657
9	33	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-03-03 04:52:03.910
10	32	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-03-02 04:26:04.553
11	31	1	admin	OTP_FAIL	0	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-02-27 10:36:28.737
12	30	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-02-27 06:31:11.370
13	29	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-02-27 06:29:59.900
14	28	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-02-27 06:20:08.607
15	27	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-02-27 06:17:43.613
16	26	1	admin	OTP_FAIL	0	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-02-27 05:59:03.160
17	25	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-02-27 05:58:40.620
18	24	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-02-27 05:58:07.853
19	23	1	admin	OTP_SUCCESS	1	3.216.102.2	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleW...	2026-02-27 05:55:16.973

Query executed successfully. staging-paceplus-2019.c326a... | rootpaceplus1 (72) | SanTanCD | 00:00:00 | 20 rows

7️⃣ Security Controls

Manual Key Exposure

- **Manual key shown only during initial enrollment**

- Hidden for all existing MFA-enabled users

Secret Generation

- Cryptographically secure RNG
- Base32 compliant
- Unique per user

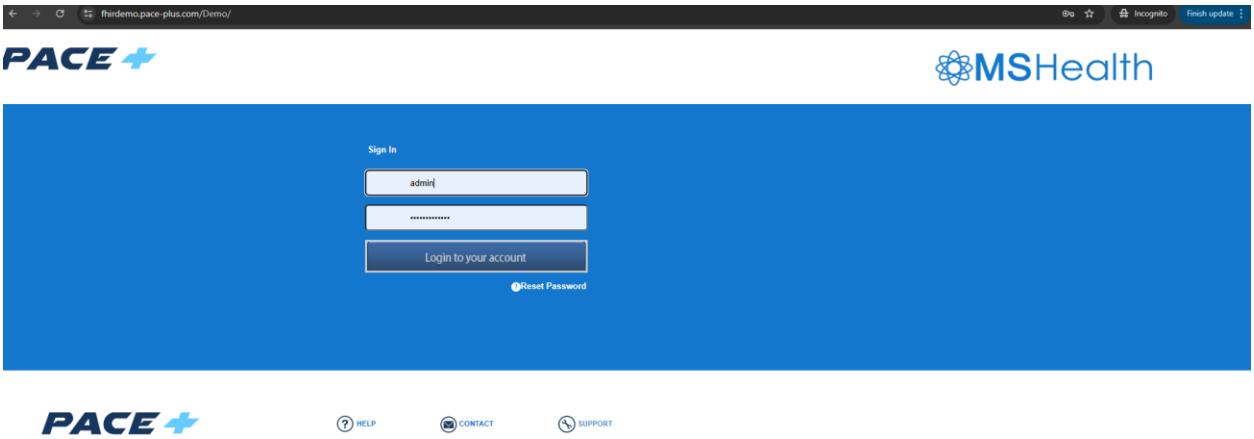
OTP Validation

- RFC 6238 compliant
- ±1 time-step drift allowed
- Constant-time comparison (SlowEquals)

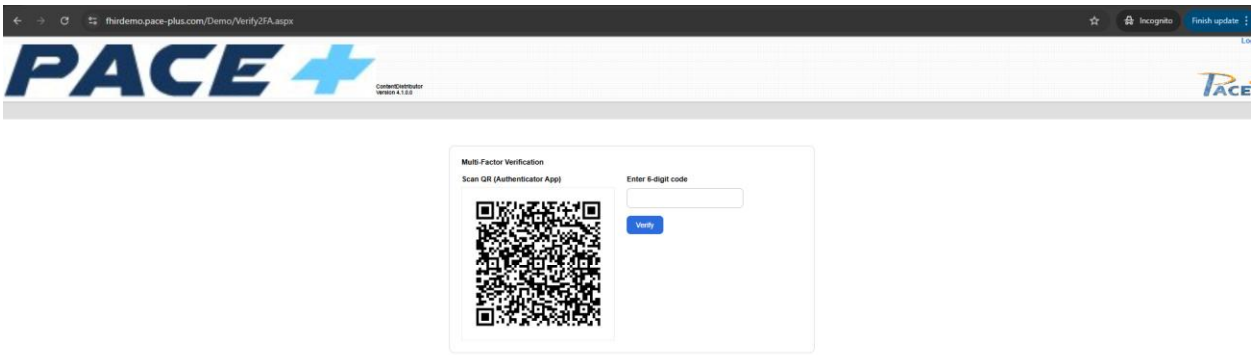
🔐 Compliance Mapping

D13 Requirement	Status
Two-factor authentication supported	✅
MFA enforcement (no bypass)	✅
Enrollment workflow	✅
OTP validation	✅
Attempt limit / lockout	✅
Audit logging	✅
Unique per-user secret	✅
Manual key exposure control	✅

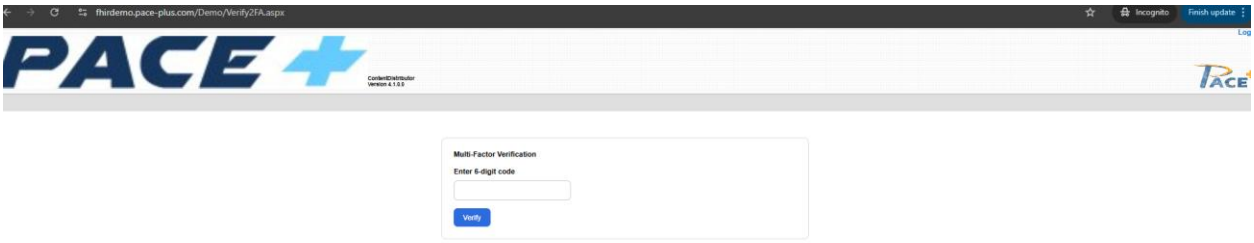
Login Page



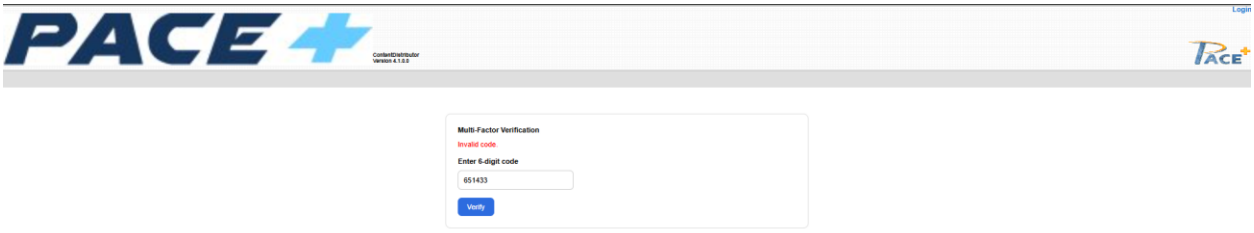
When New User Login



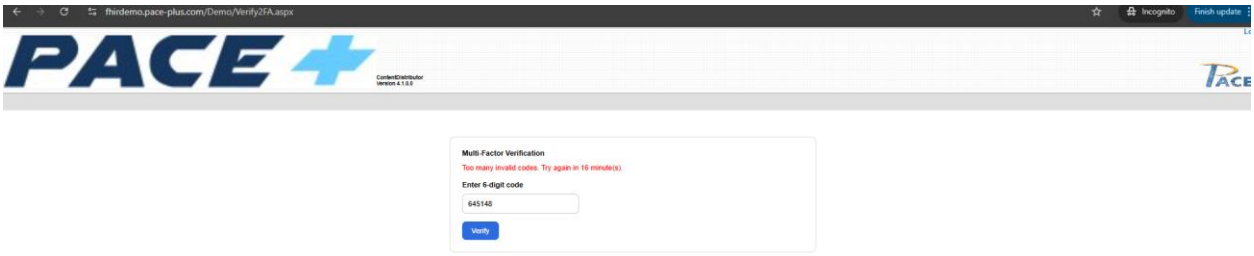
When User Already Scan Google Authentication



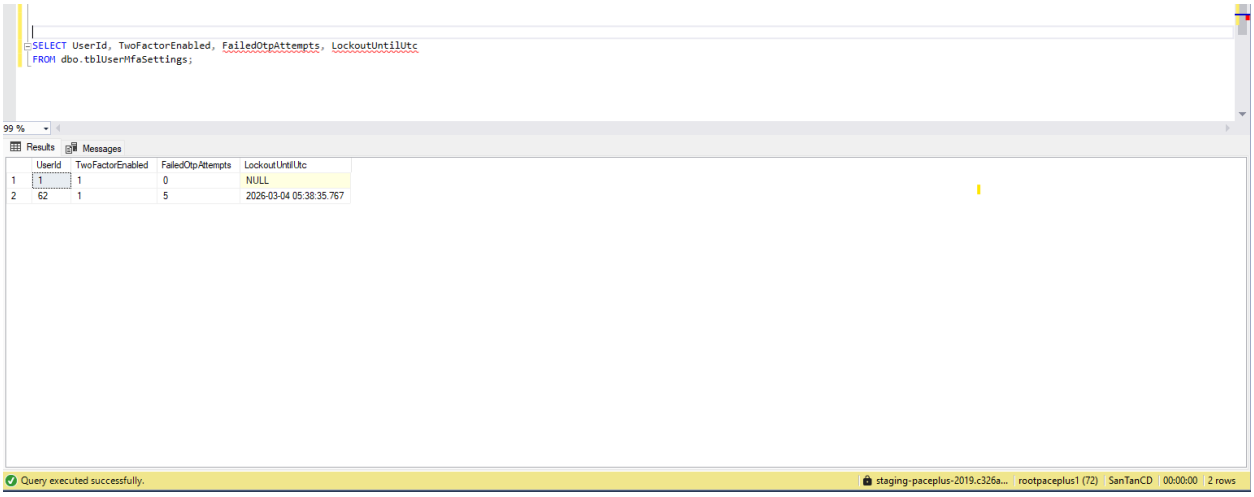
When User Enter Wrong OTP and Enter Expired OTP They showing Invalid Code



When User Enter Times Wrong OTP 5 Times Than showing Validation



5 Attempts Proof in Database



DB Proof

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99 %

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```
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```

9 %

Results | Messages

	UserId	TwoFactorEnabled	TotpSecret	RecoveryCodes	UpdatedUtc	FailedOtpAttempts	LockoutUntilUtc
1	1	1	JBSWY3DPEHPK3PXP	NULL	2026-03-03 07:23:50.710	0	NULL
2	62	1	SK63XBPFD3L6DQ6RMTYPOG6WBQOV3I76	NULL	2026-03-04 05:23:35.767	5	2026-03-04 05:38:35.767