medical record completeness and accuracy; 2) all patients were men; 3) 1 patient without histopathologically confirmed LP was included; 4) patients without a biopsy or dermatologist evaluation were excluded, possibly excluding patients less likely to be referred to a dermatology specialist; 5) the patient population had increased risk factors for HCV infection, limiting generalizability; 6) the varying natural history of LP confounded the relationship between outcome and HCV cure[1]; and 7) there were few total cases.

In sum, these limited data describe a range of responses of HCV-associated LP to serologic cure with DAA—it may resolve, improve, persist, or worsen. OLP may be more likely to resolve than cutaneous or mucocutaneous disease, although this conclusion is preliminary and severely limited by reporting and geographic biases. Prospective studies with larger cohorts are needed to better characterize LP outcomes after HCV cure.

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Bundled intervention to improve patient safety by reducing skin specimen–related errors in a tertiary dermatology practice

To the Editor: The preanalytic stage of the skin biopsy pathway is a common source of error resulting in wrong-site surgery, delayed diagnoses, emotional distress, and unnecessary costs.[1] Dermatologists reported that 50% of their most recent errors and 40% of their most serious errors constituted specimen errors.[2]

Few articles in the dermatology literature describe specific interventions for reducing specimen errors.[3,4] We aimed to reduce the number of skin specimen errors in our practice.

Six Sigma and Plan-Do-Study-Act (PDSA) methods were used. Root cause analysis identified miscommunication, time constraints, and software as challenges. Error rate equaled the number of errors per 1000 specimens. The average number of daily skin biopsy samples was the balancing measure. Pre- and postintervention surveys were administered. A chi-square test with continuity correction was used.

Table I provides an overview of the interventions.

- The standard operating procedure defined roles of team members during specimen collection and was displayed in patient rooms.
- Four hundred standardized anatomic sites (Supplemental Fig 1; available via Mendeley at https://doi.org/10.17632/hrd3swhyxm.1) replaced 4000 free-text site descriptors. A proprietary, institutionally designed, web-based body map denoted corresponding anatomic sites. The

Table I. Quality improvement interventions to reduce skin specimen–related errors

PDSA cycle (dates)	Intervention	Improvement step
PDSA 1 (Jun 1 to Aug 31, 2017)	1. SOP for skin specimen collection	1. Clearly defined roles of the clinician and nursing staff before, during, and immediately after specimen collection 2. Three verification steps, 1 of which includes the universal protocol 3. Laminated copies of SOP prominently displayed in all patient examination rooms
PDSA 2 (Sep 1 to Dec 12, 2017)	1. Standardized list of anatomic site descriptions 2. Linkage of specimen ordering and labeling software 3. RFID technology	1. Removal of manual free-text entry 2. Limited number of anatomic sites available for selection 3. Body map web application with corresponding site descriptors to aid in proper site selection 4. Order-driven label generation 5. Eliminate duplicate order and label information entry, including manual label entry 6. Automatic specimen tracking and process flow mapping
PDSA 3 (Dec 12 2017 to Feb 28, 2018)	1. RFID semiautomated accessioning software 2. Refined anatomic site descriptions and body map	1. Eliminate manual specimen accessioning 2. Refined anatomic site descriptors to include common clinical sites (ie, shoulder)

PDSA, Plan-Do-Study-Act; *RFID,* radiofrequency identification; *SOP,* standard operating procedure.

Table II. Outcome measures of skin specimen–related errors

	Baseline (Jan 1 to May 31, 2017)	PDSA 1 (Jun 1 to Aug 31, 2017	PDSA 2 (Sep 2 to Dec 12, 2017)	PDSA 3 (Dec 12, 2017 to Feb 28, 2018)
Total errors, n	59	21	22	10
Total specimens, n	11,118	7080	7716	5383
Error rate per 1000 specimens	5.3	3.0	2.9	1.9
Average daily biopsies, n	150	146	154	145
Breakdown by error type, n (% of total errors during each cycle attributed to each error type)				
Specimen anatomic site and type*	35 (59.3)	14 (66.7)	19 (86.3)	5 (50)
Specimen labeling issue†	2 (3.4)	1 (4.8)	2 (9.1)	0 (0)
Patient misidentification	3 (5.1)	3 (14.3)	0 (0)	3 (30)
Expired collection container	1 (1.7)	0 (0)	0 (0)	0 (0)
Improper collection	3 (5.1)	0 (0)	1 (4.5)	0 (0)
Mohs layer identification issue‡	8 (13.6)	1 (4.8)	0 (0)	2 (20)
Mohs inking or tissue orientation§	4 (6.8)	0 (0)	0 (0)	0 (0)
Other	3 (5.1)	2 (9.5)	0 (0)	0 (0)

PDSA, Plan-Do-Study-Act.

*Discordance of anatomic site descriptions or biopsy type between the label and order/requisition form (ie, left vs right arm, punch vs shave biopsy).

†Incorrect patient identification information (name, medical record number, date of birth, etc) on specimen label.

‡Incorrect labeling of Mohs layer (ie, labeled "A1" when "A1" was previously received).

§Tissue not inked as depicted on Mohs map or tissue placed incorrectly in Petri dish.

design used similar concepts as the online Anatomy Mapper.[5]

- For order and label linkage, new software was configured to automatically link the biopsy order and label generation, mitigating the risk of patient misidentification.
- Radiofrequency identification (RFID) technology labels included automated specimen accessioning, batch processing, and real-time specimen tracking functions using RFID point-of-care printers (Zebra ZD500R, Zebra Technologies Corp, Lincolnshire, IL) and label tracking pads

(Quake Check Box, Quake Global, Inc, San Diego, CA).

The error rate decreased from 5.3 errors per 1000 skin specimens at baseline to 1.9 errors per 1000 specimens after the intervention (χ^2 (1, n = 11,118; 5383) = 9.55; P = .001) (Table II). Most specimen errors were related to anatomic site. The greatest error reduction occurred with PDSA 1. Value stream mapping of RFID tracking data identified inefficient specimen routing from our community clinic to central processing. Process streamlining eliminated 1.5 hours and unnecessary hand-offs (Supplemental Fig 2; available via Mendeley at https://doi.org/10.17632/hrd3swhyxm.1).

This study shows technology- and workflow-based improvements that led to a reduction in specimen errors. Our interventions focused on communication, process standardization, task automatization, and specimen integrity.

The greatest error rate reduction occurred in PDSA cycle 1, likely due to the ease of implementation. The interventions in subsequent PDSA cycles were more technologically complex with greater training requirements. The extent of the benefits may not have been fully captured in the short follow-up timeframe.

RFID technology has not been reported in the dermatology literature, although use by other specialties shows favorable outcomes. We instituted RFID in a 2-step method. The semiautomated accessioning functionality implemented in PDSA 3 showed a larger impact on error rate due to errors related to manual accessioning.

These interventions may serve as best practices for other high-volume dermatology practices. RFID technology can have large upfront costs, although this may be offset by increased workflow efficiency and task automatization. The impact of each intervention is difficult to determine when bundled. Only recorded errors were captured; near misses went unaccounted for. A stewardship program was established to review adverse events and provide staff education.

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Cyclic calcipotriene 0.005% foam and 1% 5-fluorouracil cream after cryotherapy in treatment of hyperkeratotic actinic keratosis: A retrospective study

To the Editor: Traditional treatments for actinic keratoses include cryotherapy, 5-fluorouracil cream, imiquimod, diclofenac, ingenol mebutate gel, and photodynamic therapy.[1,2] Recent research suggests topical vitamin D3 as possibly efficacious by mounting a robust antitumor immunoresponse via T-cell recruitment.[3] We hypothesized that these treatments may be synergistic and that vitamin D3 would enhance the efficacy of 5-fluorouracil cream in hyperkeratotic actinic keratoses treatment after cryotherapy.

This retrospective chart review from 2016-2018 included 175 patients with actinic keratoses treated with cryotherapy (group 1, n = 50), cryotherapy followed by cyclic 1% 5-fluorouracil cream (group 2, n = 50), cryotherapy followed by cyclic 1% 5-fluorouracil cream and calcipotriene 0.005% foam (vitamin D3) (group 3, n = 50), and cryotherapy followed by cyclic vitamin D3 (group 4, n = 25). Patients in groups 2, 3, and 4 were instructed to apply