

Compliance with documentation of NB-UVB phototherapy protocols in Aziz Fatima Hospital, Faisalabad. A closed-loop audit

Mamuna Ayub*, Ayesha Iqbal, Shahwar Shakil, Esha Tariq, Maryam Rafiq, Usama Bin Yousaf

Department of Dermatology, Aziz Fatima Hospital, Faisalabad.

Abstract

Background Narrowband ultraviolet B (NB-UVB) phototherapy is an established treatment modality for several dermatological conditions, including psoriasis, vitiligo, atopic dermatitis and other inflammatory dermatoses. Safe and effective delivery requires appropriate patient selection, dose determination, monitoring of adverse effects, and adequate documentation throughout the treatment course. Inadequate adherence to phototherapy protocols and incomplete documentation may compromise the quality and traceability of phototherapy services. Clinical audits can identify deficiencies in practice and documentation and provide an opportunity for targeted quality improvement. Therefore, a closed-loop audit was conducted in the Dermatology Department of Aziz Fatima Hospital, Faisalabad.

Objective To assess and improve compliance with documentation and protocols of phototherapy in dermatology unit of Aziz Fatima Hospital, Faisalabad.

Methods Thirty patients were selected who were receiving narrowband UVB phototherapy in dermatology unit of Aziz Fatima Hospital, Faisalabad on the basis of established guidelines. A structured audit checklist was used for this closed-loop audit. A standardized phototherapy proformas and consent forms were introduced after identification of deficiencies in initial audit. In addition, logbook was revised and staff was educated regarding phototherapy protocols. After eight weeks, a re-audit was performed using same standards and same number of patients.

Results In the first audit cycle, major deficiencies were found in informed consent, protective measures, record of cumulative dose, documentation of dose increments, and assessment of patients after completing treatment. Following implementation of standardized documentation tools and staff education, documented compliance increased to 100 percent in all parameters.

Conclusion Introduction of standardized documentation tools and staff education improved compliance with NB-UVB phototherapy standards from deficient baseline levels to 100% in all audit parameters.

Keywords Clinical audit; Narrowband ultraviolet B phototherapy; Documentation; Quality improvement.

Citation: Ayub M, Iqbal A, Shehwar. Compliance with documentation of NB-UVB phototherapy protocols in Aziz Fatima Hospital, Faisalabad. A closed-loop audit. *J Pak Assoc Dermatol*. 2026;36(3):498-505.

Doi: <https://doi.org/10.66344/jpad.v36i3.3469>

Introduction

NB-UVB phototherapy is a recognized treatment modality in dermatology. Multiple dermatological diseases are managed with NB-UVB phototherapy, such as psoriasis, vitiligo, atopic dermatitis, T-cell lymphoma, and other inflammatory dermatoses. According to the bad.org.uk and British

photodermatology guidelines, the effectiveness of NB-UVB with wavelengths of 311 to 313 nanometers is higher, and adverse events are lower

Address for correspondence

Dr. Mamuna Ayub, PGR,
Department of Dermatology,
Aziz Fatima Hospital, Faisalabad.
Ph: +923368847322; Email: mamunaayub@gmail.com

as compared to broad-band UVB. These balanced features and patient tolerability make NB-UVB the most common phototherapy method in dermatology. It has improved the management of diseases in dermatology. Despite its balanced features and better patient tolerability, precise dose management and proper adherence to standard phototherapy protocols are important to achieving better outcomes.¹

To enhance the quality of phototherapy, clinical documentation has an important role. Precise and systematic documentation guarantees consistent patient care, helps healthcare professionals to monitor treatment progress. In each dermatology or phototherapy department, diagnosis and indications should be documented, along with the dose in each session, cumulative dosage, side effects, any discontinuation of therapy, and response to treatment.

Kalia S et al. evaluated the quality of phototherapy practice and found inconsistency in adherence to phototherapy protocols among dermatology departments, while present audit specifically assessed documented compliance with predefined phototherapy protocols. Variable therapeutic outcomes and increased adverse events may result from poor compliance with phototherapy protocols and standards, further contributing to decreased quality of patient management. To assess inadequacies in clinical practice and ensure the implementation of standard protocols, audit-based assessments are important.² A closed-loop audit is useful for evaluating improvements in compliance with standard protocols after implementing changes suggested following the first audit.

Maintaining proper records of phototherapy plays an important role in quality management in phototherapy units, according to UV radiation measurement guidelines. To decrease the incidence of adverse events, for example, erythema, burns, and phototoxicity, it is important to document treatment doses, cumulative exposure, side effects, and calibration of the phototherapy machine. Precise

monitoring of UV radiation exposure is important for safe phototherapy practice.³

Furthermore, the American Academy of Dermatology and the National Psoriasis Foundation guidelines require adherence to standard protocols. In order to enhance efficacy and safety of patients, the guidelines suggest proper selection of patients on the basis of indications, informed consent, proper patient counselling, assessment of contraindications, and regular dose evaluation; these are mandatory components of phototherapy protocols.⁴ This practice may reduce avoidable adverse outcomes and may enhance patient satisfaction.

To promote progressive quality improvement and reduce unsatisfactory outcomes resulting from non-adherence to standard protocols in dermatology departments, regular auditing of phototherapy units is essential.

Published local evidence was limited for the evaluation of quality of documentation and practice of standard phototherapy protocols in hospitals, especially in resource-limited settings in developing countries. Structured clinical audits may identify such deficiencies and may suggest improvements in phototherapy units of the dermatology department to optimize patient satisfaction and treatment outcomes. Hence, a closed-loop audit was conducted in the Dermatology Department of Aziz Fatima Hospital, Faisalabad, to evaluate adherence to phototherapy protocols and documentation standards, to identify gaps in standard practice, and to ensure implementation of suggested improvements.

The ultimate objective of this audit is to enhance the quality of phototherapy service and to establish evidence-based practice in the dermatology department.

Standards

The audit components were derived from British

Association of Dermatologists and British Photodermatology Group guidelines for NB-UVB phototherapy and American Academy of Dermatology phototherapy guidelines (BAD/BPG 2022).¹ Essential components for safe phototherapy practice have been mentioned in these recommendations. Target compliance for each parameter was set at 100%, agreed locally by dermatology department.

Assessed components in this audit are:

<i>Audit indicator</i>	<i>Source</i>
Indication documented	BAD/BPG 2022 + relevant local protocol
Contraindications assessed	BAD/BPG 2022 + local protocol
Written consent	BAD/BPG/service standards + local protocol
Initial dose	BAD/BPG 2022 R3
Dose increments	Departmental NB-UVB protocol based on BAD/BPG guidance
Protective measures	Departmental protocol
Adverse-effect monitoring	BAD/BPG 2022 + departmental protocol
Cumulative dose	Departmental documentation standard
Completion assessment	Locally defined audit indicator

Target Compliance 100% for each indicator (locally agreed quality-improvement target)

Sampling technique and sample size Last 30 eligible patients were selected consecutively in each audit cycle.

Formal research based sample size calculation was not performed. The sample size of 30 records per audit cycle was based on the British Association of Dermatologists (BAD) and British Photodermatology Group (BPG) 2022 guideline for NB-UVB phototherapy.

Selection criteria

Inclusion criteria

1. Patients receiving narrowband UVB (NB-UVB)

phototherapy in the Dermatology Department, Aziz Fatima Hospital, Faisalabad.

2. Patients whose NB-UVB treatment was administered during the specified audit period.
3. Patient records for which eligibility for the audit could be established.

Exclusion criteria

1. Patients receiving phototherapy modalities other than NB-UVB.
2. Records of patients who did not receive NB-UVB treatment during the specified audit period.
3. Duplicate patient records.
4. Records those were unavailable or irretrievable at the time of audit.
5. Records with insufficient information to determine eligibility for the audit.

Methods

To assess compliance with NB-UVB phototherapy protocols and documentation standards in the Dermatology department of Aziz Fatima Hospital, Faisalabad, a closed-loop audit was executed. Two cycles were included in this audit. During the first cycle, conducted from 1st June 2025 to 30th September 2025, 30 patients who received NB-UVB phototherapy in this department were selected consecutively, according to inclusion and exclusion criteria. Data was collected from patients' files and phototherapy logbooks.

After the approval from ethical review committee, data was collected in both audit cycles prospectively, using same structured audit checklist and phototherapy guidelines, and by trained data collectors who were familiarized with audit criteria and operational definition. Patients' records were cross checked to remove duplicates. To resolve discrepancies, original treatment documentations were reviewed. Patient confidentiality was maintained by assigning them unique patient ID. The audit assessed documented compliance using patient records and phototherapy logbooks. Absence

of documentation was classified as non-compliance for documentation indicators; it was not interpreted as evidence that the corresponding clinical practice had not occurred.

Age, sex, underlying dermatological disorder, Fitzpatrick skin phenotype, and the stage of treatment were collected and mentioned in **Table 1**. These demographic and clinical characteristics of records, included in two audit cycles, were mentioned to describe the case mix of two independent consecutive samples.

Documentation of treatment indication, exclusion of contraindications, informed consent, calculation and documentation of the initial dose according to minimal erythema dose testing/ small-area testing according to BAD/BPG R3, documentation of dose increments, documentation of use of protective measures, recording of adverse effects, maintenance of cumulative dose records, and completion assessment documentation were assessed during data collection. After analysis of the findings from the first audit cycle, the results were presented to the head of department and the dermatology team. Proposed interventions for quality improvement in the phototherapy unit. Implementation of a standardized documentation proforma, introduction of an appropriate informed consent form, improvement of the phototherapy logbook to include essential documentation fields, and staff education and training on recommended phototherapy practices and record-keeping were the implemented interventions. These interventions for quality improvement were suggested by head of department. After 8 weeks of implementing the proposed measures (1st November 2025 to 31st December 2025), a re-audit was conducted to assess improved compliance (1st January 2026 to 30th April 2026). We selected different 30 consecutive patients for this re-audit. Selection in re-audit was prospective. The standards and data collection tool were the same as those of first cycle of audit. For each audit criterion, compliance was calculated as a percentage.

Audit Cycle Flowchart

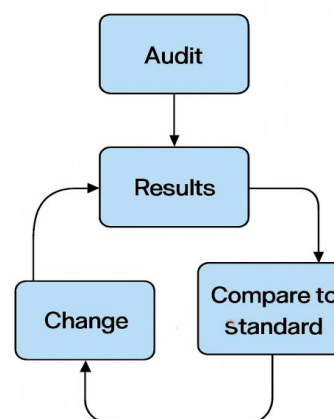


Table 1 Demographic and clinical characteristics

Characteristic	First audit (n=30)	Re-audit (n=30)
Age, median (IQR) (years)	35 median	40 median
Male	10	16
Female	20	14
Diagnosis		
Psoriasis	6	5
Vitiligo	10	12
Eczema	9	10
Other	5	3
Fitzpatrick skin type		
I	-	-
II	-	-
III	6	7
IV	12	15
V/ VI	12	8
Treatment stage		
Newly initiated	13	20
Ongoing treatment	17	10
Maintenance/ completion phase	-	-

Audit Checklist and Operational Definitions

A structured audit checklist was used for both audit cycles. Each audit indicator was assessed according to predefined operational definitions. The unit of analysis was the patient record. For course-level indicators, one assessment was made per eligible patient record. For session-level indicators, all eligible phototherapy sessions documented within the audited treatment course were assessed.

Tale 2 Audit Checklist and Operational Definitions.

<i>Audit indicator</i>	<i>Operational definition of compliance</i>	<i>Level of assessment</i>
Indication documented	The clinical indication/diagnosis for NB-UVB treatment was documented in the patient record.	Course-level
Contraindications excluded	Relevant contraindications to NB-UVB phototherapy were assessed and documented as absent before/at initiation of treatment.	Course-level
Written informed consent	A signed informed consent document for NB-UVB phototherapy was present in the patient record before treatment.	Course-level
Correct initial dose calculation and documentation	Initial dose determined according to MED testing or a small-area test, as applicable, in accordance with BAD/BPG 2022 recommendation R3.	Course-level
Dose increments recorded	For each eligible session requiring a dose change, the administered dose and change from the previous dose were documented according to the predefined phototherapy protocol.	Session-level
Protective eyewear/genital shielding	Required protective measures were documented for each eligible phototherapy session according to departmental protocol.	Session-level
Adverse effects	Assessment of adverse effects, or explicit documentation that no adverse effects were present, was recorded at each eligible treatment visit.	Session-level
Cumulative dose	The cumulative NB-UVB dose was recorded and updated throughout the treatment course.	Course-level
Completion assessment	Assessment at completion/discontinuation of the treatment course was documented.	End-of-course

Scoring

An indicator was classified as compliant when the predefined requirement was fulfilled. It was classified as non-compliant when the required documentation or action was absent or did not meet the predefined criterion. Not applicable (N/A) was used only when an indicator genuinely did not apply to the patient or treatment course. Missing documentation was not assumed to represent clinical performance; however, for documentation indicators, absence of the required record was classified as non-compliant because the audit assessed documentation standards.

For session-level indicators, the patient record was considered compliant only when the required documentation was present for all eligible sessions included in the audited treatment course. Course-level indicators were assessed once per patient record. End-of-course indicators were assessed only for treatment courses that had reached completion or discontinuation during the audited period.

For each indicator, the denominator comprised the

number of eligible patient records for which the indicator applied. Compliance was calculated as the number of compliant records divided by the eligible denominator, expressed as a percentage.

Results

In the first audit cycle, total 30 patients' records were reviewed. Then, after implementation of the interventions for the quality improvement, separate 30 patients were selected for the re-audit. The parameter that was complete in both audit cycles was documentation of treatment indication and exclusion of contraindications (30/30, 100% vs. 30/30, 100%; Fisher's exact test, $P=1.000$)(Table 2).

There were several deficiencies that were found during first audit cycle. Documentation of written informed consent was 0/30 (0%) in first audit cycle compared with 30/30, 100% during the re-audit (Fisher exact test, $P<0.001$) (Table 3).

Similarly, documentation of protective eye wear and genital shielding increased from 0/30, (0%) to 30/30, 100% ($P<0.001$). Documentation of cumulative dose

Table 3 Comparison of compliance with NB-UVB phototherapy standards between the first audit cycle and re-audit.

Audit criterion	First audit cycle, n (%)	Re-audit n (%)	Fisher's exact p-value
Indication documented	30/30 (100%)	30/30 (100%)	1.000
Contraindications excluded	30/30 (100%)	30/30 (100%)	1.000
Informed consent obtained	0/30 (0%)	30/30 (100%)	<0.001
Correct initial dose calculation and documentation	25/30 (83.3%)	30/30 (100%)	0.052
Dose increments recorded	10/30 (33.3%)	30/30 (100%)	<0.001
Protective eyewear and genital shielding documented	0/30 (0%)	30/30 (100%)	<0.001
Documentation of adverse effects or confirmation of absence of adverse effects	15/30 (50.0%)	30/30 (100%)	<0.001
Cumulative dose record maintained	0/30 (0%)	30/30 (100%)	<0.001
Completion assessment documented	0/3 (0%)	4/4 (100%)	<0.029

Note: Fisher's exact test was used for comparison of independent proportions. Two-sided $P < 0.05$ was considered statistically significant.

increased from 0/30 (0%) to 30/30, 100% ($P < 0.001$). Documentation of dose increments improved from 10/30 (33.3%) in first audit to 30/30 (100%) in the re-audit (Fisher exact test, $P < 0.001$). Documentation of complete assessment after the treatment also increased from 0/3 (0 %) to 4/4 (100%), as 3 and 4 patients were reached at the stage where treatment completed in 1st and 2nd audit cycle respectively. (Fisher exact test, $P < 0.001$). Similarly, documentation of adverse effects or confirmation of their absence improved from 15/30 (50.0%) to 30/30 (100%). (Fisher exact test, $P < 0.001$). Initial dose calculation was documented in 25/30 cases in first audit cycle (83.3%). And during the re-audit, it was increased to 30/30 (100%). This difference was not statistically significant ($P = 0.052$) (Table 3). The comparison of documented compliance between the two audit cycles is shown in Figure 1.

In two parameters, compliance was already 100% during both audit cycles. Compliance improved across all those parameters that were found deficient during first audit cycle, while statistically significant differences were observed for most deficient parameters. Its important to mention that small sample size limits the precision. For 30/30 observations, the two-sided exact 95% confidence interval is approximately 88.4-100%. The audit

process and chronology are summarized in Figure 2.

Statistical analysis

For the analysis of the data, appropriate descriptive and inferential statistics were used. To express the compliance with each audit criterion, frequency and percentage was used. Observations between two cycles were independent because a separate sample of 30 patient records was used for the re-audit. Fisher's exact test was used to compare the proportion of records between two audit cycles, and P -value < 0.05 was considered statistically significant.

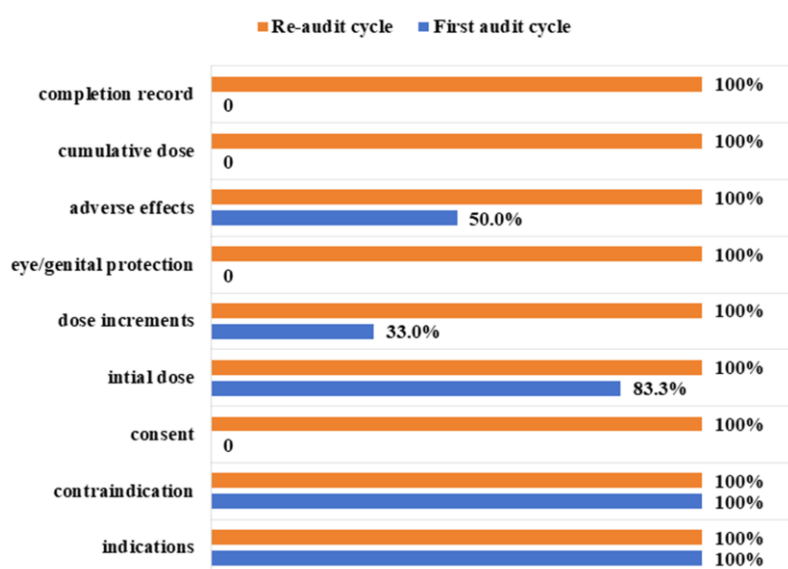


Figure 1 Graphical comparison of compliance with NB-UVB phototherapy standards between the first audit cycle and re-audit

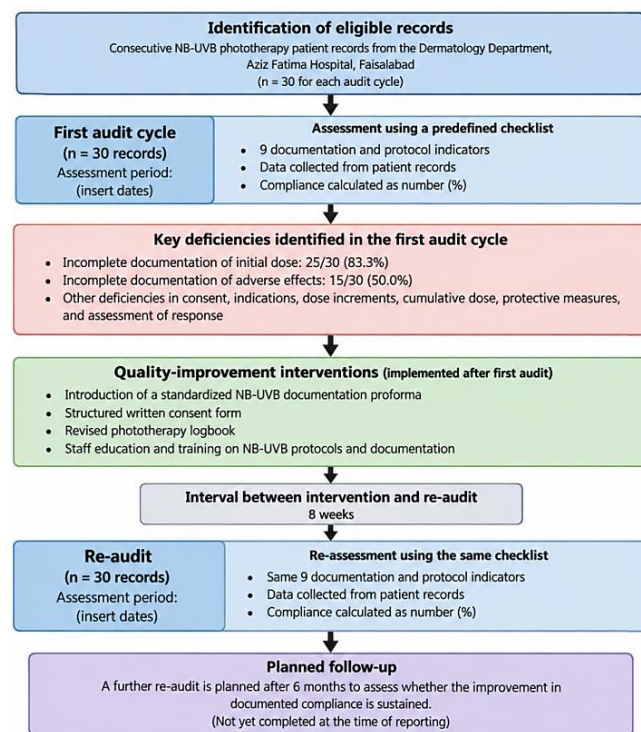


Figure 2 Study specific flow diagram showing audit progress, interventions and re-audit in dermatology department, Aziz Fatima Hospital, Faisalabad.

Discussion

This closed-loop audit assessed compliance with standard protocols and documentation of narrowband UVB phototherapy in the dermatology unit of a tertiary care hospital. For documentation of indications and contraindications, compliance was excellent-100%-in the first audit cycle. This indicated that the selection of patients for narrowband UVB phototherapy was appropriate. However, there were deficiencies found in some documentation-related parameters, for example, informed consent, documentation of protective measures, cumulative dose records, treatment monitoring, and documentation of assessment of patients after completion of treatment. The absence of a structured phototherapy recording system resulted in inconsistent record-keeping

Deficiencies observed in the results of the initial audit primarily reflected inadequate documentation rather than deficiencies in clinical care. But clinical observations were not recorded as separate audit

outcomes. Therefore, this audit only evaluates documented compliance. Absence of documentation should not be interpreted as absence of clinical practice.

After interpretation and discussion of the results of the initial audit with senior faculty and the head of department, the following parameters were suggested for quality improvement: standard phototherapy protocols, written informed consent forms, revision of phototherapy logbooks, and staff education. After implementation of the following quality improvement measures, compliance to documentation improved to 100% across all deficient audit parameters. These findings from the second audit demonstrated that simple interventions can significantly improve adherence to documentation standards.

These results show that clinical audits and standardized documentation tools and protocols enhance compliance with phototherapy guidelines. This audit demonstrated that structured documentation and record-keeping systems can improve clinical governance and long-term quality improvements in phototherapy services.

Keeping in view the present findings of this closed loop audit, we cannot conclude any improvement in patient safety, because this audit did not assess clinical efficacy or patient safety and adverse effects due to treatment. Therefore, it is important to mention that improvements as a result of this audit ensured better documentation and record-keeping practices rather than better clinical outcomes. Although improved adherence to protocols may predict safer clinical practice and patient safety, but this requires future audits assessing patient safety and clinical outcome measures.

Limitations

The findings of this audit are not generalized because it was conducted in a single tertiary care dermatology unit with a relatively small sample size of 30 patient records per audit cycle. As separate

consecutive samples were included in both audit cycles, therefore case mix differences between cycles cannot be excluded. Due to short interval of eight weeks between the intervention and re-audit, long-term sustainability cannot be evaluated.

There are multiple factors which may have contributed to observed improvement in documentation. For example, changes in staff behaviour, awareness of the audit (Hawthorne effect), observation by audit team and assessor bias. Contribution of standardized performance, consent form, revised logbook, and staff education in quality improvement of documentation cannot be determined individually because all these interventions were implemented simultaneously.

Moreover, this audit assessed compliance with documentation and standard protocols rather than treatment outcomes and patient satisfaction. This audit cannot demonstrate whether these quality improvement measures resulted in better clinical outcomes. It only shows substantial improvement in documentation practices. To ensure the sustainability of results and improve patient care and safety, long-term follow-up audits are required.

Conclusion

In this closed-loop audit, major parameters of baseline documentation practices for narrowband UVB phototherapy were found to be deficient. Following the introduction of simple parameters, including a standard phototherapy proforma, a consent documentation system, and staff education, documented compliance increased to 100% for all predefined indicators during re audit. This manifests that structured documentation tools and regular audit cycles can have better effects on adherence to narrowband UVB phototherapy protocols and strengthening documentation within dermatology practice. More audit cycles in future, assessing clinical safety outcomes with long-term follow-up, are required in order to assess the improvements in patient safety due to improved documentation and

protocol adherence.

Financial support and sponsorship None.

Conflict of interest No conflict of interest.

Author's contribution

MA: Substantial contribution to acquisition of data and manuscript writing.

AI,ET: Substantial contribution to conception and study design, critically revision of the manuscript.

SS,UBY: Substantial contribution to analysis and interpretation of data, manuscript writing.

MR: Substantial contribution to conception and study design, manuscript writing.

Every author has given final approval of the manuscript version to be published and agreed to be accountable for all aspects of the work.

References

1. Goulden V, Ling TC, Babakinejad P, Dawe R, Eadie E, Fassihi H, et al. British Association of Dermatologists and British Photodermatology Group guidelines for narrowband ultraviolet B phototherapy 2022. *Br J Dermatol*. 2022;**187(3)**:295-308. doi:10.1111/bjd.21669.
2. Kalia S, Toosi B, Bansback N, et al. Assessing adherence with phototherapy protocols. *J Am Acad Dermatol*. 2014;**71(6)**:1259-61. doi:10.1016/j.jaad.2014.07.046
3. Moseley H, Allan D, Amatiello H, et al. Guidelines on the measurement of ultraviolet radiation levels in ultraviolet phototherapy. *Br J Dermatol*. 2015;**173(2)**:333-50. doi:10.1111/bjd.13937.
4. Elmetts CA, Lim HW, Stoff B, Connor C, Cordoro KM, Lebwohl M, et al. Joint American Academy of Dermatology-National Psoriasis Foundation guidelines of care for the management and treatment of psoriasis with phototherapy. *J Am Acad Dermatol*. 2019;**81(3)**:775-804. doi:10.1016/j.jaad.2019.04.042.